

ANALYTICAL REPORT

June 11, 2019

¹Cp

²Tc

³Ss

⁴Cn

⁵Tr

⁶Gl

⁷Al

⁸Sc

Cardno - Newark, DE

Sample Delivery Group: L1099017

Samples Received: 05/15/2019

Project Number:

Description:

Report To: Art Saunders
121 Continental Drive Suite 308
Newark, DE 19713

Entire Report Reviewed By:



Craig Cothron
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace National is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

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ONE LAB. NATIONWIDE.



Cp: Cover Page	1	¹ Cp
Tc: Table of Contents	2	² Tc
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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



WW-20190513-002-DAY11 L1099017-01 GW Collected by CP/RF Collected date/time 05/13/19 11:30 Received date/time 05/15/19 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Subcontracted Analyses	WG1282167	1	06/05/19 00:00	06/05/19 00:00	CBM	Minneapolis, MN 55414

WW-20190513-002-DAY11 L1099017-02 GW Collected by CP/RF Collected date/time 05/13/19 11:30 Received date/time 05/15/19 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Subcontracted Analyses	WG1282172	1	05/24/19 00:00	05/24/19 00:00	CBM	Subcontract

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Gl⁷ Al⁸ Sc



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Craig Cothron
Project Manager

- ¹ Cp
- ² Tc
- ³ Ss
- ⁴ Cn
- ⁵ Tr
- ⁶ Gl
- ⁷ Al
- ⁸ Sc

Project Narrative

L1099017 -01, -02 contains subout data that is included after the chain of custody.



This data package consists of this signature page, the laboratory review checklist, and the following reportable data as applicable:

R1 - Field chain-of-custody documentation;

R2 - Sample identification cross-reference;

R3 - Test reports (analytical data sheets) for each environmental sample that includes:

- a. Items consistent with NELAC Chapter 5,
- b. dilution factors,
- c. preparation methods,
- d. cleanup methods, and
- e. if required for the project, tentatively identified compounds (TICs).

R4 - Surrogate recovery data including:

- a. Calculated recovery (%R), and
- b. The laboratory's surrogate QC limits.

R5 - Test reports/summary forms for blank samples;

R6 - Test reports/summary forms for laboratory control samples (LCSs) including:

- a. LCS spiking amounts,
- b. Calculated %R for each analyte, and
- c. The laboratory's LCS QC limits.

R7 - Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

- a. Samples associated with the MS/MSD clearly identified,
- b. MS/MSD spiking amounts,
- c. Concentration of each MS/MSD analyte measured in the parent and spiked samples,
- d. Calculated %Rs and relative percent differences (RPDs), and
- e. The laboratory's MS/MSD QC limits

R8 - Laboratory analytical duplicate (if applicable) recovery and precision:

- a. The amount of analyte measured in the duplicate,
- b. The calculated RPD, and
- c. The laboratory's QC limits for analytical duplicates.

R9 - List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.

R10 - Other problems or anomalies.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Craig Cothron
Project Manager



Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

SDG	Sample Delivery Group.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
	The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

¹Cp²Tc³Ss⁴Cn⁵Tr⁶Gl⁷Al⁸Sc



Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.

- * Not all certifications held by the laboratory are applicable to the results reported in the attached report.
- * Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660
Alaska	17-026
Arizona	AZ0612
Arkansas	88-0469
California	2932
Colorado	TN00003
Connecticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia ¹	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky ^{1,6}	90010
Kentucky ²	16
Louisiana	AI30792
Louisiana ¹	LA180010
Maine	TN0002
Maryland	324
Massachusetts	M-TN003
Michigan	9958
Minnesota	047-999-395
Mississippi	TN00003
Missouri	340
Montana	CERT0086

Nebraska	NE-OS-15-05
Nevada	TN-03-2002-34
New Hampshire	2975
New Jersey-NELAP	TN002
New Mexico ¹	n/a
New York	11742
North Carolina	Env375
North Carolina ¹	DW21704
North Carolina ³	41
North Dakota	R-140
Ohio-VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	LA000356
South Carolina	84004
South Dakota	n/a
Tennessee ^{1,4}	2006
Texas	T104704245-18-15
Texas ⁵	LAB0152
Utah	TN00003
Vermont	VT2006
Virginia	460132
Washington	C847
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

Third Party Federal Accreditations

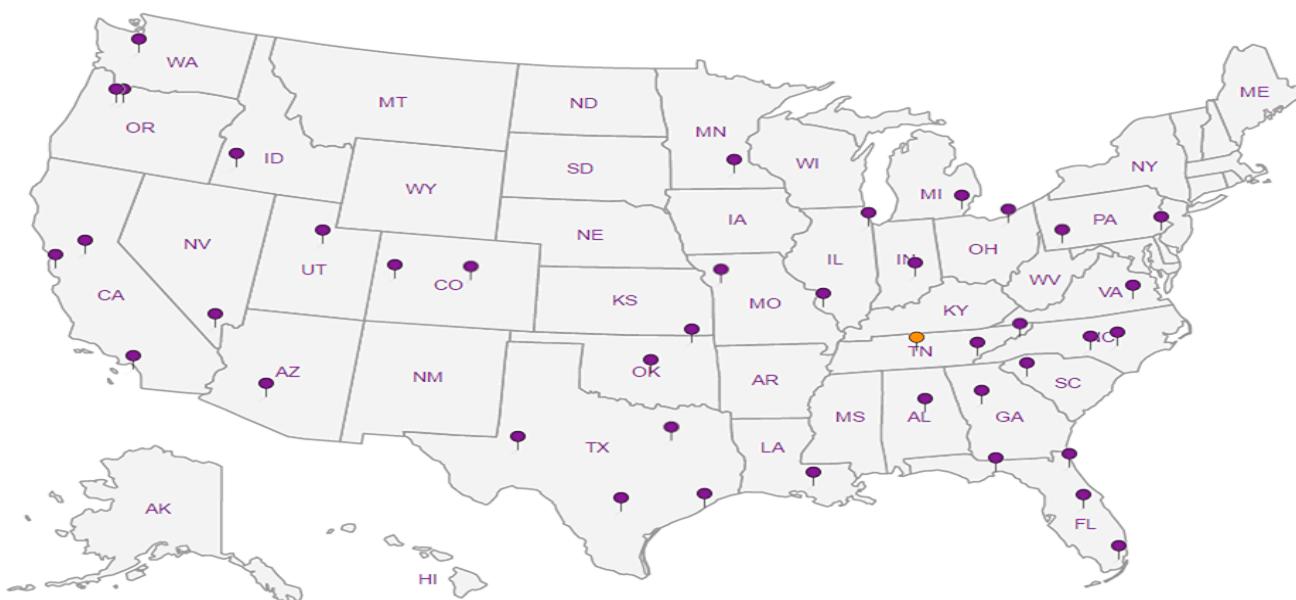
A2LA – ISO 17025	1461.01
A2LA – ISO 17025 ⁵	1461.02
Canada	1461.01
EPA-Crypto	TN00003

AIHA-LAP,LLC EMLAP	100789
DOD	1461.01
USDA	P330-15-00234

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ⁶ Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



- ¹ Cp
- ² Tc
- ³ Ss
- ⁴ Cn
- ⁵ Tr
- ⁶ Gl
- ⁷ Al
- ⁸ Sc

Cardno - Newark, DE 121 Continental Drive, Suite 308 Newark, DE 19713			Billing Information:			Pres Chk	Analysis / Container / Preservative						Chain of Custody		
			Accounts Payable 121 Continental Drive, Suite 308 Newark, DE 19713										Page ____ of ____		
Report to: Art Saunders			Email To: art.saunders@cardno.com												
Project Description:			City/State Collected:												
Phone: 610-220-3957	Client Project #		Lab Project # CARDNONDE-ITC												
Fax:															
Collected by (print): C.Pilla R.Frizzell	Site/Facility ID #		P.O. #												
Collected by (signature): C.Pilla	Rush? (Lab MUST Be Notified)		Quote #												
Immediately Packed on Ice N <input checked="" type="checkbox"/> Y <input type="checkbox"/>	<input type="checkbox"/> Same Day <input type="checkbox"/> Five Day <input type="checkbox"/> Next Day <input type="checkbox"/> 5 Day (Rad Only) <input type="checkbox"/> Two Day <input type="checkbox"/> 10 Day (Rad Only) <input type="checkbox"/> Three Day		Date Results Needed			No. of Cntrs									
Sample ID	Comp/Grab	Matrix *	Depth	Date	Time										
	GW														
WW-20190513-002-Day11	Comp	WW		5/13/19	1130	JY	X	X	X	X	X	X	X	X	-01
WW-20190513-002-Day11	Grab	WW		5/13/19	1130	T			X						02
* Matrix: SS - Soil AIR - Air F - Filter GW - Groundwater B - Bioassay WW - WasteWater DW - Drinking Water OT - Other			Remarks:			pH _____ Temp _____ Flow _____ Other _____						Sample Receipt Checklist COC Seal Present/Intact: <input checked="" type="checkbox"/> NP <input type="checkbox"/> Y <input type="checkbox"/> N COC Signed/Accurate: <input type="checkbox"/> Y <input type="checkbox"/> N Bottles arrive intact: <input type="checkbox"/> Y <input type="checkbox"/> N Correct bottles used: <input type="checkbox"/> Y <input type="checkbox"/> N Sufficient volume sent: <input type="checkbox"/> Y <input type="checkbox"/> N If Applicable VOA Zero Headspace: <input type="checkbox"/> Y <input type="checkbox"/> N Preservation Correct/Checked: <input type="checkbox"/> Y <input checked="" type="checkbox"/> N RAD SCREEN: <0.5 mR/hr			
Relinquished by : (Signature)			Date: 5/13/19	Time: 15:05	Received by: (Signature)	Trip Blank Received: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No HCl MeOH TBR									
Relinquished by : (Signature)			Date: 5/14/19	Time: 19:30	Received by: (Signature)	Temp: A3.0F °C 3.261=3.3			Bottles Received: 76	If preservation required by Login: Date/Time					
Relinquished by : (Signature)			Date: 5/15/19	Time: 8:00	Received for lab by: (Signature)	Date: 5/15/19	Time: 8:00	Hold: 	Condition: NCF / OK						

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859



L# **W09017**
D126

Acctnum: **CARDNONDE**
Template: **T149278**
Prelogin: **P704877**
TSR: **034-Craig Cothron**
PB:
Shipped Via:

Remarks Sample # (lab only)

Cardno - Newark, DE 121 Continental Drive, Suite 308 Newark, DE 19713			Billing Information: Accounts Payable 121 Continental Drive, Suite 308 Newark, DE 19713			Pres Chk	Analysis / Container / Preservative					Chain of Custody	Page ___ of ___	
								<2	>12	>12			Pace Analytical® National Center for Testing & Innovation	
Report to: Art Saunders			Email To: art.saunders@cardno.com									12065 Lebanon Rd Mount Juliet, TN 37122 Phone: 615-758-5858 Phone: 800-767-5859 Fax: 615-758-5859		
Project Description:			City/State Collected:									L # U099017		
Phone: 610-220-3957	Client Project #		Lab Project # CARDNONDE-ITC									Table #		
Collected by (print): C.Pilla, R.Frizzell	Site/Facility ID #		P.O. #									Acctnum: CARDNONDE		
Collected by (signature): 	Rush? (Lab MUST Be Notified)		Quote #									Template: T149278		
Immediately Packed on Ice N <input checked="" type="checkbox"/> Y <input checked="" type="checkbox"/>	<input type="checkbox"/> Same Day <input type="checkbox"/> Five Day <input type="checkbox"/> Next Day <input type="checkbox"/> 5 Day (Rad Only) <input type="checkbox"/> Two Day <input type="checkbox"/> 10 Day (Rad Only) <input type="checkbox"/> Three Day		Date Results Needed			No. of Cntrs						Prelogin: P704877		
Sample ID	Comp/Grab	Matrix *	Depth	Date	Time		V8260AP9 40mL Amb-HCl	8270AP9 100mL Amb-NoPres	TOC 250mL Amb-HCl	Cyanide 250mL HDPE Amb-NaOH	Sulfide 125mL Amb-S-NaOH+ZnAC	PFAS/PFOS 250mL Teflon Free	TSR: 034-Craig Cothron	PB:
												Shipped Via:		
												Remarks	Sample # (lab only)	
GW														
WW-20190513-002-Day1 Comp	WW	5/13/19	1130	+2	X	X	X	X	X	X	X		-01/02	
WW-20190513-002-Day1 Grab	WW	5/13/19	1130	+2	X			X						
* Matrix: SS - Soil AIR - Air F - Filter GW - Groundwater B - Bioassay WW - WasteWater DW - Drinking Water OT - Other _____	Remarks: Samples returned via: UPS <input checked="" type="checkbox"/> FedEx <input checked="" type="checkbox"/> Courier <input checked="" type="checkbox"/> SWA						pH _____	Temp _____	Flow _____	Other _____	Sample Receipt Checklist COC Seal Present/Intact: <input checked="" type="checkbox"/> NP <input checked="" type="checkbox"/> Y <input type="checkbox"/> N COC Signed/Accurate: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N Bottles arrive intact: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N Correct bottles used: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N Sufficient volume sent: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N <u>If Applicable</u> VOA Zero Headspace: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N Preservation Correct/Checked: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N RAD SCREEN: <0.5 mR/hr			
Relinquished by: (Signature)	Date: 5/13/19	Time: 15:05	Received by: (Signature)	Trip Blank Received: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> HCl MeOH TBR		Tracking #								
Relinquished by: (Signature)	Date: 5/14/19	Time: 19:30	Received by: (Signature)	Temp: A38F °C		Bottles Received: 32+1=33	If preservation required by Login: Date/Time							
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 5/15/19	Time: 8:00	Hold:	Condition: NCF / OK							



Ana-Lab Corp.
P.O. Box 9000
Kilgore, TX 75663
903/984-0551

LELAP-accredited #02008

Report

Table of Contents

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Pace Analytical/TN
 12065 Lebanon Rd
 Mt Juliet, TN 37122

Account

PAJL-A

Project

874547

This report consists of this Table of Contents and the following pages:

<u>Report Name</u>	<u>Description</u>	<u>Pages</u>
874547_r03_03_ProjectResults	Ana-Lab Project P:874547 C:PAJL Project Results t:304 PO: L1099017	2
874547_r10_05_ProjectQC	Ana-Lab Project P:874547 C:PAJL Project Quality Control Groups	1
874547_r99_09_CoC_1_of_1	Ana-Lab CoC PAJL 874547_1_of_1	2
Total Pages:		5



Corporate Shipping: 2600 Dudley Rd. Kilgore, TX 75662



NELAP-accredited #T104704201-19-15



Results

Printed: 05/22/2019 17:03

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874547

Report To

Pace Analytical/TN
12065 Lebanon Rd
Mt Juliet, TN 37122

Account

PAJL-A

Results

178468 WW-20190513-002-DAY11

Received: 05/17/2019

Non-Potable Water

Collected by: Client

Pace Analytical/TN

PO: L1099017

Taken: 05/13/2019 11:30:00

EPA 245.7 2

Prepared: 839346 05/22/2019 06:52:56 Analyzed 839521 05/22/2019 13:31:00 LPS

Parameter

Results

Units

RL

Flag

CAS

Bottle

N Mercury, Total (low level)

<4.26

ng/L

4.26

7439-97-6

02

Sample Preparation

178468 WW-20190513-002-DAY11

Received: 05/17/2019

L1099017

Cooler Return

Prepared: 05/20/2019 17:00:00 Analyzed 05/20/2019 17:00:00 MG3

z Return Cooler/No bottles Require

Returned

EPA 245.7 2

Prepared: 839346 05/22/2019 06:52:56 Analyzed 839346 05/22/2019 06:52:56 LPS

N Low Level Mercury Liquid Metals

50/47

ml

01

Corporate Shipping: 2600 Dudley Rd. Kilgore, TX 75662

Corporate: 2600 Dudley Road Kilgore TX 75662





Results

Printed: 05/22/2019 17:03

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874547

Qualifiers:

We report results on an As Received or wet basis unless marked Dry Weight. Unless otherwise noted, testing was performed at Ana-labs corporate laboratory that holds the following Federal and State certificates: EPA Lab Number TX00063, US Department of Agriculture Soil Import Permit P330-17-00117, Texas Commission on Environmental Quality Commercial Drinking Water Lab Approval (Lab ID: TX219), Texas Commission on Environmental Quality NELAP T104704201-19-15, Louisiana Department of Environmental Quality Laboratory Certification (NELAP, LELAP) #02008, Louisiana Department of Health and Hospitals Drinking Water (NELAP) Certificate No LA026, Oklahoma Department of Environmental Quality TNI Laboratory Accreditation Program Certificate No. 2018-126, Arkansas Department of Environmental Quality Certification #18-068-0. The Accredited column designates accreditation by N -- NELAC, or z -- not covered under NELAC scope of accreditation.

These analytical results relate to the sample tested. This report may NOT be reproduced EXCEPT in FULL without written approval of Ana-Lab Corp. Unless otherwise specified, these test results meet the requirements of NELAC.

RL is the Reporting Limit (sample specific quantitation limit) and is at or above the Method Detection Limit (MDL). CAS is Chemical Abstract Service number. RL is our Reporting Limit, or Minimum Quantitation Level. The RL takes into account the Instrument Detection Limit (IDL), Method Detection Limit (MDL), and Practical Quantitation Limit (PQL), and any dilutions and/or concentrations performed during sample preparation (EQL). Our analytical result must be above this RL before we report a value in the 'Results' column of our report (without a 'J' flag). Otherwise, we report ND (Not Detected above RL), because the result is "<" (less than) the number in the RL column. MAL is Minimum Analytical Level and is typically from regulatory agencies. Unless we report a result in the result column, or interferences prevent it, we work to have our RL at or below the MAL.

Bill Peery, MS, VP Technical Services



Corporate Shipping: 2600 Dudley Rd. Kilgore, TX 75662

Corporate: 2600 Dudley Road Kilgore TX 75662





Quality Control

Printed 05/22/2019

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Report To

Pace Analytical/TN
12065 Lebanon Rd
Mt Juliet, TN 37122

Account

PAJL-A

Analytical Set 839521

EPA 245.7 2

AWRL/MRL C

<u>Parameter</u>		<u>Reading</u>	<u>Known</u>	<u>Units</u>	<u>Recover%</u>	<u>Limits%</u>	<u>File</u>				
Mercury, Total (low level)		4.34	5.00	ng/L	86.8	70.0 - 130	119954834				
Blank											
<u>Parameter</u>	<u>PrepSet</u>	<u>Reading</u>	<u>MDL</u>	<u>MQL</u>	<u>Units</u>		<u>File</u>				
Mercury, Total (low level)	839346	ND	1.65	4.00	ng/L		119954838				
CCV											
<u>Parameter</u>		<u>Reading</u>	<u>Known</u>	<u>Units</u>	<u>Recover%</u>	<u>Limits%</u>	<u>File</u>				
Mercury, Total (low level)		10.0	10.0	ng/L	100	76.0 - 124	119954837				
		10.4	10.0	ng/L	104	76.0 - 124	119954845				
		10.3	10.0	ng/L	103	76.0 - 124	119954856				
		10.2	10.0	ng/L	102	76.0 - 124	119954867				
ICL											
<u>Parameter</u>		<u>Reading</u>	<u>Known</u>	<u>Units</u>	<u>Recover%</u>	<u>Limits%</u>	<u>File</u>				
Mercury, Total (low level)		103	100	ng/L	103	90.0 - 110	119954836				
ICV											
<u>Parameter</u>		<u>Reading</u>	<u>Known</u>	<u>Units</u>	<u>Recover%</u>	<u>Limits%</u>	<u>File</u>				
Mercury, Total (low level)		9.81	10.0	ng/L	98.1	90.0 - 110	119954835				
LCS Dup											
<u>Parameter</u>	<u>PrepSet</u>	<u>LCS</u>	<u>LCSD</u>	<u>Known</u>	<u>Limits%</u>	<u>LCS%</u>	<u>LCSD%</u>	<u>Units</u>	<u>RPD</u>	<u>Limit%</u>	
Mercury, Total (low level)	839346	25.9	26.4		25.0	76.0 - 113	104	106	ng/L	1.91	50.0
MSD											
<u>Parameter</u>	<u>Sample</u>	<u>MS</u>	<u>MSD</u>	<u>UNK</u>	<u>Known</u>	<u>Limits</u>	<u>MS%</u>	<u>MSD%</u>	<u>Units</u>	<u>RPD</u>	<u>Limit%</u>
Mercury, Total (low level)	1784628	31.5	32.3	4.49	26.6	67.0 - 111	102	105	ng/L	2.92	18.0
	1784688	21.8	21.2	ND	26.6	67.0 - 111	82.0	79.7	ng/L	2.79	18.0

* Out RPD is Relative Percent Difference: $\text{abs}(r1-r2) / \text{mean}(r1,r2) * 100\%$

Recover% is Recovery Percent: result / known * 100%

Blank - Method Blank; CCV - Continuing Calibration Verification; ICV - Initial Calibration Verification; AWRL/MRL C - Ambient Water Reporting Limit/Minimum Reporting Limit Check Std



1 of 2

874547 CoC Print Group 001 of 001

Sub-Contract Chain of Custody						
Batch Date/Time: 05/16/19 11:13 Sub-Contract Lab: ANALABKTX Address: 2600 Dudley Rd. City/State: Kilgore, TX 75662-3730 Contact: tayna.chitwood@analab.com			WO: WG1282172 Results Due Date: 05/30/19 ESC Purchase Order #: L1099017 Send Reports to: Bentia Miller Email: SuboutTeam@esclabsciences.com			 Pace Analytical [®] <small>Environmental Center for Testing & Consulting</small> 12065 Lebanon Rd. Mt. Juliet, TN 37122 call:(615)773-9756
Sample ID Container ID	Matrix	State	Collect Date	Description	Sample Number	
WW-20190513-002-DAYII	GW	DE	05/13/19 11:30	mercury 245.7 QC3	L1099017-02	mercury 245.7 QC3
Relinquished by:	<i>Bm</i>		Date	05/16/19		
Received by:	<i>LSO</i>		Date	5/17/19 0830	<i>1784686</i>	
Relinquished by:	<i>LSO</i>		Date	5/17/19 0830		
Received by:	<i>Kathy Farwell</i>		Anal. Lab Date	5/17/19 0830		

See Attached for
Tracking # and Temp

2 of 2

874547 CoC Print Group 001 of 001



ORIGIN ID:BNAA (615) 758-5958
 SHIPPING
 PACE ANALYTICAL NATIONAL
 12065 LEBANON PIKE
 MOUNT JULIET, TN 37122
 UNITED STATES US

SHIP DATE: 18MAY18
 ACTWT: 26.75 LB
 CRD: 0361800/CAFE3211
 BILL SENDER

TO MS. TAYNA CHITWOOD
 ANA LAB
 2600 DUDLEY RD

KILGORE TX 756623730
 REF: ANALABTX
 (615) 758-5958
 PO: ANALABTX



FRI - 17 MAY 3:00P
 STANDARD OVERNIGHT
 TRK# 4882 8631 8397

XX GCGA 75662
 TX-US SHV



Thermit	Corr Fact	Temp(°C)
<input type="checkbox"/> 6205		
<input type="checkbox"/> 6443		
<input type="checkbox"/> 6444		
<input checked="" type="checkbox"/> 6093	0.0	0210.2

Date 5/17 Time 1100 Tech 100



Ana-Lab Corp.
P.O. Box 9000
Kilgore, TX 75663
903/984-0551

LELAP-accredited #02008

Report

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Pace Analytical/TN
 12065 Lebanon Rd
 Mt Juliet, TN 37122

Account

PAJL-A

Project

874547

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Corporate Shipping: 2600 Dudley Rd. Kilgore, TX 75662



NELAP-accredited #T104704201-19-15



Results

Printed: 05/22/2019 17:03

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874547

Report To

Pace Analytical/TN
12065 Lebanon Rd
Mt Juliet, TN 37122

Account

PAJL-A

Results

178468 WW-20190513-002-DAY11

Received: 05/17/2019

Non-Potable Water

Collected by: Client

Pace Analytical/TN

PO: L1099017

Taken: 05/13/2019 11:30:00

EPA 245.7 2

Prepared: 839346 05/22/2019 06:52:56 Analyzed 839521 05/22/2019 13:31:00 LPS

Parameter

Results

Units

RL

Flag

CAS

Bottle

N Mercury, Total (low level)

<4.26

ng/L

4.26

7439-97-6

02

Sample Preparation

178468 WW-20190513-002-DAY11

Received: 05/17/2019

L1099017

Cooler Return

Prepared: 05/20/2019 17:00:00 Analyzed 05/20/2019 17:00:00 MG3

z Return Cooler/No bottles Require

Returned

EPA 245.7 2

Prepared: 839346 05/22/2019 06:52:56 Analyzed 839346 05/22/2019 06:52:56 LPS

N Low Level Mercury Liquid Metals

50/47

ml

01

Corporate Shipping: 2600 Dudley Rd. Kilgore, TX 75662

Corporate: 2600 Dudley Road Kilgore TX 75662





Results

Printed: 05/22/2019 17:03

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Qualifiers:

We report results on an As Received or wet basis unless marked Dry Weight. Unless otherwise noted, testing was performed at Ana-labs corporate laboratory that holds the following Federal and State certificates: EPA Lab Number TX00063, US Department of Agriculture Soil Import Permit P330-17-00117, Texas Commission on Environmental Quality Commercial Drinking Water Lab Approval (Lab ID: TX219), Texas Commission on Environmental Quality NELAP T104704201-19-15, Louisiana Department of Environmental Quality Laboratory Certification (NELAP, LELAP) #02008, Louisiana Department of Health and Hospitals Drinking Water (NELAP) Certificate No LA026, Oklahoma Department of Environmental Quality TNI Laboratory Accreditation Program Certificate No. 2018-126, Arkansas Department of Environmental Quality Certification #18-068-0. The Accredited column designates accreditation by N -- NELAC, or z -- not covered under NELAC scope of accreditation.

These analytical results relate to the sample tested. This report may NOT be reproduced EXCEPT in FULL without written approval of Ana-Lab Corp. Unless otherwise specified, these test results meet the requirements of NELAC.

RL is the Reporting Limit (sample specific quantitation limit) and is at or above the Method Detection Limit (MDL). CAS is Chemical Abstract Service number. RL is our Reporting Limit, or Minimum Quantitation Level. The RL takes into account the Instrument Detection Limit (IDL), Method Detection Limit (MDL), and Practical Quantitation Limit (PQL), and any dilutions and/or concentrations performed during sample preparation (EQL). Our analytical result must be above this RL before we report a value in the 'Results' column of our report (without a 'J' flag). Otherwise, we report ND (Not Detected above RL), because the result is "<" (less than) the number in the RL column. MAL is Minimum Analytical Level and is typically from regulatory agencies. Unless we report a result in the result column, or interferences prevent it, we work to have our RL at or below the MAL.

Bill Peery, MS, VP Technical Services



Corporate Shipping: 2600 Dudley Rd. Kilgore, TX 75662

Corporate: 2600 Dudley Road Kilgore TX 75662





Quality Control

Printed 05/22/2019

Page 1 of 1
874547

Report To

Pace Analytical/TN
12065 Lebanon Rd
Mt Juliet, TN 37122

Account

PAJL-A

Analytical Set 839521

EPA 245.7 2

AWRL/MRL C

<u>Parameter</u>		<u>Reading</u>	<u>Known</u>	<u>Units</u>	<u>Recover%</u>	<u>Limits%</u>	<u>File</u>				
Mercury, Total (low level)		4.34	5.00	ng/L	86.8	70.0 - 130	119954834				
Blank											
<u>Parameter</u>	<u>PrepSet</u>	<u>Reading</u>	<u>MDL</u>	<u>MQL</u>	<u>Units</u>		<u>File</u>				
Mercury, Total (low level)	839346	ND	1.65	4.00	ng/L		119954838				
CCV											
<u>Parameter</u>		<u>Reading</u>	<u>Known</u>	<u>Units</u>	<u>Recover%</u>	<u>Limits%</u>	<u>File</u>				
Mercury, Total (low level)		10.0	10.0	ng/L	100	76.0 - 124	119954837				
		10.4	10.0	ng/L	104	76.0 - 124	119954845				
		10.3	10.0	ng/L	103	76.0 - 124	119954856				
		10.2	10.0	ng/L	102	76.0 - 124	119954867				
ICL											
<u>Parameter</u>		<u>Reading</u>	<u>Known</u>	<u>Units</u>	<u>Recover%</u>	<u>Limits%</u>	<u>File</u>				
Mercury, Total (low level)		103	100	ng/L	103	90.0 - 110	119954836				
ICV											
<u>Parameter</u>		<u>Reading</u>	<u>Known</u>	<u>Units</u>	<u>Recover%</u>	<u>Limits%</u>	<u>File</u>				
Mercury, Total (low level)		9.81	10.0	ng/L	98.1	90.0 - 110	119954835				
LCS Dup											
<u>Parameter</u>	<u>PrepSet</u>	<u>LCS</u>	<u>LCSD</u>	<u>Known</u>	<u>Limits%</u>	<u>LCS%</u>	<u>LCSD%</u>	<u>Units</u>	<u>RPD</u>	<u>Limit%</u>	
Mercury, Total (low level)	839346	25.9	26.4		25.0	76.0 - 113	104	106	ng/L	1.91	50.0
MSD											
<u>Parameter</u>	<u>Sample</u>	<u>MS</u>	<u>MSD</u>	<u>UNK</u>	<u>Known</u>	<u>Limits</u>	<u>MS%</u>	<u>MSD%</u>	<u>Units</u>	<u>RPD</u>	<u>Limit%</u>
Mercury, Total (low level)	1784628	31.5	32.3	4.49	26.6	67.0 - 111	102	105	ng/L	2.92	18.0
	1784688	21.8	21.2	ND	26.6	67.0 - 111	82.0	79.7	ng/L	2.79	18.0

* Out RPD is Relative Percent Difference: $\text{abs}(r1-r2) / \text{mean}(r1,r2) * 100\%$

Recover% is Recovery Percent: result / known * 100%

Blank - Method Blank; CCV - Continuing Calibration Verification; ICV - Initial Calibration Verification; AWRL/MRL C - Ambient Water Reporting Limit/Minimum Reporting Limit Check Std



1 of 2

874547 CoC Print Group 001 of 001

Sub-Contract Chain of Custody						
Batch Date/Time: 05/16/19 11:13 Sub-Contract Lab: ANALABKTX Address: 2600 Dudley Rd. City/State: Kilgore, TX 75662-3730 Contact: tayna.chitwood@analab.com			WO: WG1282172 Results Due Date: 05/30/19 ESC Purchase Order #: L1099017 Send Reports to: Bentia Miller Email: SuboutTeam@esclabsciences.com			 Pace Analytical [®] <small>Environmental Center for Testing & Consulting</small> 12065 Lebanon Rd. Mt. Juliet, TN 37122 call:(615)773-9756
Sample ID Container ID	Matrix	State	Collect Date	Description	Sample Number	
WW-20190513-002-DAYII	GW	DE	05/13/19 11:30	mercury 245.7 QC3	L1099017-02	mercury 245.7 QC3
Relinquished by:	<i>Bm</i>		Date	05/16/19		
Received by:	<i>LSO</i>		Date	5/17/19 0830	<i>1784686</i>	
Relinquished by:	<i>LSO</i>		Date	5/17/19 0830		
Received by:	<i>Kathy Farwell</i>		Anal. Lab Date	5/17/19 0830		

See Attached for
Tracking # and Temp

2 of 2

874547 CoC Print Group 001 of 001



ORIGIN ID:BNAA (615) 758-5958
 SHIPPING
 PACE ANALYTICAL NATIONAL
 12065 LEBANON PIKE
 MOUNT JULIET, TN 37122
 UNITED STATES US

SHIP DATE: 18MAY18
 ACTWT: 26.75 LB
 CRD: 0361800/CAFE3211
 BILL SENDER

TO MS. TAYNA CHITWOOD
 ANA LAB
 2600 DUDLEY RD

KILGORE TX 756623730
 REF: ANALABTX
 (615) 758-5958
 PO: ANALABTX



FRI - 17 MAY 3:00P
 STANDARD OVERNIGHT
 TRK# 4882 8631 8397

XX GCGA 75662
 TX-US SHV



Thermit	Corr Fact	Temp(°C)
<input type="checkbox"/> 6205		
<input type="checkbox"/> 6443		
<input type="checkbox"/> 6444		
<input checked="" type="checkbox"/> 6093	0.0	0210.2

Date 5/17 Time 1100 Tech 100

Report Prepared for:

Benita Miller
Pace Analytical National
12065 Lebanon Road
Mount Juliet TN 37122

**REPORT OF
LABORATORY
ANALYSIS FOR
PCDD/PCDF**

Report Prepared Date:
May 31, 2019

Report Information:

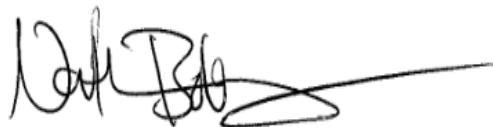
Pace Project #: 10475345
Sample Receipt Date: 05/17/2019
Client Project #: L1099017: WG1282167
Client Sub PO #: L1099017
State Cert #: T104704192

Invoicing & Reporting Options:

The report provided has been invoiced as a Level 3 PCDD/PCDF Report. If an upgrade of this report package is requested, an additional charge may be applied.

Please review the attached invoice for accuracy and forward any questions to Nathan Boberg, your Pace Project Manager.

This report has been reviewed by:



June 03, 2019

Nathan Boberg, Project Manager
612-360-0728
(612) 607-6444 (fax)
nathan.boberg@pacelabs.com



Report of Laboratory Analysis

This report should not be reproduced, except in full, without the written consent of Pace Analytical Services, Inc.

The results relate only to the samples included in this report.



Pace Analytical Services, LLC.
1700 Elm Street
Minneapolis, MN 55414
Phone: 612.607.1700
Fax: 612.607.6444

DISCUSSION

This report presents the results from the analysis performed on one sample submitted by a representative of Pace Analytical National. The sample was analyzed for the presence or absence of polychlorodibenzo-p-dioxins (PCDDs) and polychlorodibenzofurans (PCDFs) using USEPA Method 1613B. The reporting limits were based on signal-to-noise measurements. Estimated Maximum Possible Concentration (EMPC) values were treated as positives in the toxic equivalence calculations.

The recoveries of the isotopically-labeled PCDD/PCDF internal standards in the sample extract ranged from 57-86%. All of the labeled standard recoveries obtained for this project were within the target ranges specified in Method 1613B. Also, since the quantification of the native 2,3,7,8-substituted congeners was based on isotope dilution, the data were automatically corrected for recovery and accurate values were obtained.

Values were flagged "I" where incorrect isotope ratios were obtained. Concentrations below the calibration range were flagged "J" and should be regarded as estimates.

A laboratory method blank was prepared and analyzed with the sample batch as part of our routine quality control procedures. The results show the blank to contain a trace level of OCDD. This level was below the calibration range of the method. The concentration reported for OCDD in the field sample was similar to the corresponding blank level, flagged "B" on the results table, and may be, at least partially, attributed to the background. It should be noted that levels less than ten times the background are not generally considered to be statistically different from the background.

Laboratory spike samples were also prepared with the sample batch using clean reference matrix that had been fortified with native standard materials. The results show that the spiked native compounds were recovered at 95-121% with relative percent differences of 0.0-10.5%. These results were within the target ranges for the method. Matrix spikes were not prepared with the sample batch.

REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Minnesota Laboratory Certifications

Authority	Certificate #	Authority	Certificate #
A2LA	2926.01	Minnesota - Pet	1240
Alabama	40770	Mississippi	MN00064
Alaska - DW	MN00064	Missouri - DW	10100
Alaska - UST	17-009	Montana	CERT0092
Arizona	AZ0014	Nebraska	NE-OS-18-06
Arkansas - DW	MN00064	Nevada	MN00064
Arkansas - WW	88-0680	New Hampshire	2081
CNMI Saipan	MP0003	New Jersey (NE	MN002
California	2929	New York	11647
Colorado	MN00064	North Carolina	27700
Connecticut	PH-0256	North Carolina -	27700
EPA Region 8+	via MN 027-053	North Carolina -	530
Florida (NELAP	E87605	North Dakota	R-036
Georgia	959	Ohio - DW	41244
Guam	17-001r	Ohio - VAP	CL101
Hawaii	MN00064	Oklahoma	9507
Idaho	MN00064	Oregon - Primar	MN300001
Illinois	200011	Oregon - Secon	MN200001
Indiana	C-MN-01	Pennsylvania	68-00563
Iowa	368	Puerto Rico	MN00064
Kansas	E-10167	South Carolina	74003
Kentucky - DW	90062	South Dakota	NA
Kentucky - WW	90062	Tennessee	TN02818
Louisiana - DE	03086	Texas	T104704192
Louisiana - DW	MN00064	Utah (NELAP)	MN00064
Maine	MN00064	Virginia	460163
Maryland	322	Washington	C486
Massachusetts	M-MN064	West Virginia -	382
Michigan	9909	West Virginia -	9952C
Minnesota	027-053-137	Wisconsin	999407970
Minnesota - De	via MN 027-053	Wyoming - UST	2926.01

REPORT OF LABORATORY ANALYSIS

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Report No.....10475345

Reporting Flags

- A = Reporting Limit based on signal to noise
- B = Less than 10x higher than method blank level
- C = Result obtained from confirmation analysis
- D = Result obtained from analysis of diluted sample
- E = Exceeds calibration range
- I = Interference present
- J = Estimated value
- L = Suppressive interference, analyte may be biased low
- Nn = Value obtained from additional analysis
- P = PCDEInterference
- R = Recovery outside target range
- S = Peak saturated
- U = Analyte not detected
- V = Result verified by confirmation analysis
- X = %D Exceeds limits
- Y = Calculated using average of daily RFs
- * = SeeDiscussion

REPORT OF LABORATORY ANALYSIS

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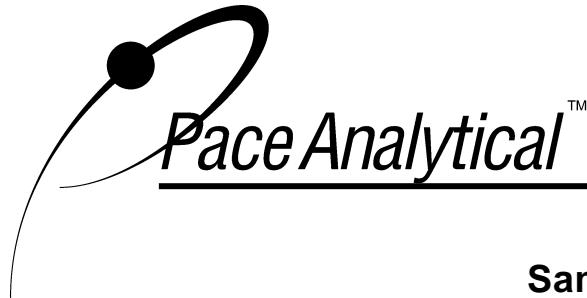
Report No.....10475345

Report No.....10475345_1613FC_DFR

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Appendix A

Sample Management



Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Sample ID Cross Reference

Client Sample ID

WW-20190513-002-DAY11

Pace Sample ID

10475345001

Date Received

05/17/2019

Sample Type

Water

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc.

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A

Required Client Information:

Company: Pace Analytical National
Address: 12065 Lebanon Road
Mount Juliet, TN 37122
Email: SuboutTeam@pacenational.com
Phone: (615)773-9756 Fax: (615)758-5859
Requested Due Date: 30-May

Section B

Required Project Information:

Report To: Pace Analytical National Subout Team
Copy To:
Purchase Order #: L1099017
Project Name: N/A
Project #: N/A

Section C

Invoice Information:

Attention: Art Saunders
Company Name:
Address:
Pace Quote:
Pace Project Manager: Nathan Boberg
Pace Profile #: 38076

Page : 1 Of 1

Regulatory Agency

State/Location

DE

Requested Analysis Filtered (Y/N)

WO# : 10475345



10475345

Residual Chlorine (Y/N)

QC3 NEEDED

ITEM #	SAMPLE ID One Character per box. (A-Z, 0-9 /, -) Sample Ids must be unique	MATRIX Drinking Water Water Waste Water Product Soil/Solid Oil Wipe Air Other Tissue	CODE DW WT WW P SL OL WP AR OT TS	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMB)	COLLECTED		SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives		Analysis Test	Comments
						START	END			H2SO4	HNO3		
						DATE	TIME			DATE	TIME		
1	WW-20190513-002-DAY11		WT			13-May	11:30	1	Unpreserved	HCl	Methanol	X	Dioxin/Furans method 1613
2													PFOS&PFAS method 537
10													
11													
12													

ADDITIONAL COMMENTS	RElinquished by AFFILIATION	DATE	TIME	ACCEPTED BY AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
Pace Analytical National Batch: WG1282167	Benita Miller	16-May	13:34	<i>Carrie Pace</i>	5/17/19	0845	1.1 Y Y Y
Pace Analytical National SDGs: L1099017							
Location: Minneapolis, MN 55414							

SAMPLER NAME AND SIGNATURE		TEMP in C
PRINT Name of SAMPLER:		
SIGNATURE of SAMPLER:		
DATE Signed:		
Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	
Samples In tact (Y/N)		



Document Name:
Sample Condition Upon Receipt Form

Document Revised: 09May2019
Page 1 of 1
Issuing Authority:
Pace Minnesota Quality Office

**Sample Condition
Upon Receipt**

Client Name:

Project #:

Pace National

WO# : 10475345

PM: NB3

Due Date: 06/03/19

CLIENT: ESC_TN

Courier:

Fed Ex UPS USPS Client
 Pace SpeeDee Commercial See Exception

Tracking Number: 1023 1352 1175

Custody Seal on Cooler/Box Present? Yes No **Seals Intact?** Yes No **Biological Tissue Frozen?** Yes No N/A

Packing Material: Bubble Wrap Bubble Bags None Other: PB **Temp Blank?** Yes No

Thermometer: T1(0461) T2(1336) T3(0459)
 T4(0254) T5(0489) **Type of Ice:** Wet Blue None Dry Melted

Note: Each West Virginia Sample must have temp taken (no temp blanks)

Temp should be above freezing to 6°C	Cooler Temp Read w/temp blank: 0.9 °C	Average Corrected Temp See Exceptions (no temp blank only): <input type="checkbox"/>
Correction Factor: +0.2	Cooler Temp Corrected w/temp blank: 1.1 °C	

USDA Regulated Soil: (N/A, water sample/Other: _____)

Date/Initials of Person Examining Contents: CG 5/17/19

Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA, MS, NC, NY, OK, OR, SC, TN, TX or VA (check maps)? Yes No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? Yes No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

			COMMENTS:
Chain of Custody Present and Filled Out?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	1.	
Chain of Custody Relinquished?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	2.	
Sampler Name and/or Signature on COC?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	3.	
Samples Arrived within Hold Time?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	4.	
Short Hold Time Analysis (<72 hr)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	5. <input type="checkbox"/> Fecal Coliform <input type="checkbox"/> HPC <input type="checkbox"/> Total Coliform/E coli <input type="checkbox"/> BOD/cBOD <input type="checkbox"/> Hex Chrome <input type="checkbox"/> Turbidity <input type="checkbox"/> Nitrate <input type="checkbox"/> Nitrite <input type="checkbox"/> Orthophos <input type="checkbox"/> Other	
Rush Turn Around Time Requested?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	6.	
Sufficient Volume?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	7.	
Correct Containers Used? -Pace Containers Used?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	8.	
Containers Intact?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	9.	
Field Filtered Volume Received for Dissolved Tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	10. Is sediment visible in the dissolved container? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Is sufficient information available to reconcile the samples to the COC?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	11. If no, write ID/ Date/Time on Container Below: <input type="checkbox"/> See Exception	
Matrix: <input checked="" type="checkbox"/> Water <input type="checkbox"/> Soil <input type="checkbox"/> Oil <input type="checkbox"/> Other			
All containers needing acid/base preservation have been checked?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	12. Sample #	
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO ₃ , H ₂ SO ₄ , <2pH, NaOH>9 Sulfide, NaOH>12 Cyanide)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	<input type="checkbox"/> NaOH <input type="checkbox"/> HNO ₃ <input type="checkbox"/> H ₂ SO ₄ <input type="checkbox"/> Zinc Acetate	
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Positive for Res. <input type="checkbox"/> Yes <input type="checkbox"/> Chlorine? <input type="checkbox"/> No	pH Paper Lot# <input type="checkbox"/> See Exception
Headspace in VOA Vials (greater than 6mm)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Res. Chlorine 0-6 Roll 0-6 Strip 0-14 Strip	
Trip Blank Present?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	13. <input type="checkbox"/> See Exception	
Trip Blank Custody Seals Present?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	14. Pace Trip Blank Lot # (if purchased): NJA	

CLIENT NOTIFICATION/RESOLUTION

Person Contacted: _____ Date/Time: _____
Comments/Resolution: _____

Field Data Required? Yes No

Project Manager Review: Nathan Roberts

Date: 5/20/19

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers).

Labeled by: Cliff

Appendix B

Sample Analysis Summary



Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Method 1613B Sample Analysis Results

Client - Pace Analytical National

Client's Sample ID	WW-20190513-002-DAY11				
Lab Sample ID	10475345001				
Filename	F190529C_07				
Injected By	ZMS				
Total Amount Extracted	992 mL		Matrix	Water	
% Moisture	NA		Dilution	NA	
Dry Weight Extracted	NA		Collected	05/13/2019 11:30	
ICAL ID	F190508		Received	05/17/2019 08:45	
CCal Filename(s)	F190529B_14		Extracted	05/23/2019 09:10	
Method Blank ID	BLANK-70738		Analyzed	05/30/2019 00:18	

Native Isomers	Conc pg/L	EMPC pg/L	EDL pg/L	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	---	2.2	2,3,7,8-TCDF-13C	2.00	82
Total TCDF	ND	---	2.2	2,3,7,8-TCDD-13C	2.00	81
				1,2,3,7,8-PeCDF-13C	2.00	80
2,3,7,8-TCDD	ND	---	3.0	2,3,4,7,8-PeCDF-13C	2.00	79
Total TCDD	ND	---	3.0	1,2,3,7,8-PeCDD-13C	2.00	86
				1,2,3,4,7,8-HxCDF-13C	2.00	69
1,2,3,7,8-PeCDF	ND	---	5.7	1,2,3,6,7,8-HxCDF-13C	2.00	70
2,3,4,7,8-PeCDF	ND	---	5.3	2,3,4,6,7,8-HxCDF-13C	2.00	74
Total PeCDF	ND	---	5.5	1,2,3,7,8,9-HxCDF-13C	2.00	75
				1,2,3,4,7,8-HxCDD-13C	2.00	66
1,2,3,7,8-PeCDD	ND	---	6.4	1,2,3,6,7,8-HxCDD-13C	2.00	62
Total PeCDD	ND	---	6.4	1,2,3,4,6,7,8-HpCDF-13C	2.00	63
				1,2,3,4,7,8,9-HpCDF-13C	2.00	64
1,2,3,4,7,8-HxCDF	ND	---	1.4	1,2,3,4,6,7,8-HpCDD-13C	2.00	72
1,2,3,6,7,8-HxCDF	ND	---	2.3	OCDD-13C	4.00	57
2,3,4,6,7,8-HxCDF	ND	---	1.7			
1,2,3,7,8,9-HxCDF	ND	---	2.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	---	1.8	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	---	3.5	2,3,7,8-TCDD-37Cl4	0.20	113
1,2,3,6,7,8-HxCDD	ND	---	1.9			
1,2,3,7,8,9-HxCDD	ND	---	3.1			
Total HxCDD	ND	---	2.8			
1,2,3,4,6,7,8-HpCDF	ND	---	1.5	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	---	1.8	Equivalence: 0.0035 pg/L		
Total HpCDF	ND	---	1.7	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	ND	---	2.8			
Total HpCDD	ND	---	2.8			
OCDF	ND	---	2.7			
OCDD	12	---	4.8	BJ		

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).

ND = Not Detected

EMPC = Estimated Maximum Possible Concentration

NA = Not Applicable

EDL = Estimated Detection Limit

NC = Not Calculated

J = Estimated value

B = Less than 10x higher than method blank level

REPORT OF LABORATORY ANALYSIS

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2,3,7,8-TCDD Toxic Equivalency (TEQ) Calculations

Pace Analytical National

Client's Sample ID	WW-20190513-002-DAY11		
Lab Sample ID	10475345001		
Filename	F190529C_07		
Injected By	ZMS		
Total Amount Extracted	992 mL	Matrix	Water
% Moisture	NA	Dilution	NA
Dry Weight Extracted	NA	Collected	05/13/2019 11:30
ICAL ID	F190508	Received	05/17/2019 08:45
CCal Filename(s)	F190529B_14	Extracted	05/23/2019 09:10
Method Blank ID	BLANK-70738	Analyzed	05/30/2019 00:18

Parameter	Conc pg/L	RL pg/L	WHO2005	LB	MB	UB
2,3,7,8-TCDF	ND	2.2	0.10000	0.0000	0.1113	0.2226
Total TCDF	ND	2.2	0.00000	0.0000	0.0000	0.0000
2,3,7,8-TCDD	ND	3.0	1.00000	0.0000	1.4926	2.9853
Total TCDD	ND	3.0	0.00000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDF	ND	5.7	0.03000	0.0000	0.0861	0.1721
2,3,4,7,8-PeCDF	ND	5.3	0.30000	0.0000	0.7899	1.5799
Total PeCDF	ND	5.5	0.00000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDD	ND	6.4	1.00000	0.0000	3.2024	6.4048
Total PeCDD	ND	6.4	0.00000	0.0000	0.0000	0.0000
1,2,3,4,7,8-HxCDF	ND	1.4	0.10000	0.0000	0.0717	0.1434
1,2,3,6,7,8-HxCDF	ND	2.3	0.10000	0.0000	0.1143	0.2286
2,3,4,6,7,8-HxCDF	ND	1.7	0.10000	0.0000	0.0834	0.1668
1,2,3,7,8,9-HxCDF	ND	2.0	0.10000	0.0000	0.0986	0.1972
Total HxCDF	ND	1.8	0.00000	0.0000	0.0000	0.0000
1,2,3,4,7,8-HxCDD	ND	3.5	0.10000	0.0000	0.1741	0.3482
1,2,3,6,7,8-HxCDD	ND	1.9	0.10000	0.0000	0.0941	0.1882
1,2,3,7,8,9-HxCDD	ND	3.1	0.10000	0.0000	0.1565	0.3129
Total HxCDD	ND	2.8	0.00000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HpCDF	ND	1.5	0.01000	0.0000	0.0075	0.0149
1,2,3,4,7,8,9-HpCDF	ND	1.8	0.01000	0.0000	0.0092	0.0185
Total HpCDF	ND	1.7	0.00000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HpCDD	ND	2.8	0.01000	0.0000	0.0139	0.0277
Total HpCDD	ND	2.8	0.00000	0.0000	0.0000	0.0000
OCDF	ND	2.7	0.00030	0.0000	0.0004	0.0008
OCDD	12	4.8	0.00030	0.0035	0.0035	0.0035

0.0035 pg/L 6.5 pg/L 13 pg/L

Final values are valid to only 2 significant figures

TEQs for Totals classes include contributions from non 2,3,7,8 isomers only

LB = Lower Bound, Where "ND", TEQ Conc = 0

MB = Medium Bound, Where "ND", TEQ Conc = (LOD/2) * (TEF Factor)

UB = Upper Bound, Where "ND", TEQ Conc = LOD * (TEF Factor)

RL = Reporting Limit

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Appendix C

QC and Calibration Results Summary



Method 1613B Blank Analysis Results

Lab Sample Name	DFBLKYI	Matrix	
Lab Sample ID	BLANK-70738	Dilution	Water
Filename	Y190529A_05	Extracted	NA
Total Amount Extracted	1000 mL	Analyzed	05/23/2019 09:10
ICAL ID	Y190424	Injected By	05/29/2019 12:39
CCal Filename(s)	Y190529A_01	ZMS	

Native Isomers	Conc pg/L	EMPC pg/L	EDL pg/L	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	---	1.5	2,3,7,8-TCDF-13C	2.00	76
Total TCDF	ND	---	1.5	2,3,7,8-TCDD-13C	2.00	72
				1,2,3,7,8-PeCDF-13C	2.00	83
2,3,7,8-TCDD	ND	---	2.2	2,3,4,7,8-PeCDF-13C	2.00	85
Total TCDD	ND	---	2.2	1,2,3,7,8-PeCDD-13C	2.00	86
				1,2,3,4,7,8-HxCDF-13C	2.00	85
1,2,3,7,8-PeCDF	ND	---	2.0	1,2,3,6,7,8-HxCDF-13C	2.00	89
2,3,4,7,8-PeCDF	ND	---	1.7	2,3,4,6,7,8-HxCDF-13C	2.00	89
Total PeCDF	ND	---	1.9	1,2,3,7,8,9-HxCDF-13C	2.00	89
				1,2,3,4,7,8-HxCDD-13C	2.00	77
1,2,3,7,8-PeCDD	ND	---	2.8	1,2,3,6,7,8-HxCDD-13C	2.00	70
Total PeCDD	ND	---	2.8	1,2,3,4,6,7,8-HpCDF-13C	2.00	79
				1,2,3,4,7,8-HpCDF-13C	2.00	82
1,2,3,4,7,8-HxCDF	ND	---	4.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	83
1,2,3,6,7,8-HxCDF	ND	---	3.5	OCDD-13C	4.00	87
2,3,4,6,7,8-HxCDF	ND	---	3.6			
1,2,3,7,8,9-HxCDF	ND	---	3.1	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	---	3.5	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	---	7.3	2,3,7,8-TCDD-37Cl4	0.20	85
1,2,3,6,7,8-HxCDD	ND	---	6.9			
1,2,3,7,8,9-HxCDD	ND	---	7.8			
Total HxCDD	ND	---	7.3			
1,2,3,4,6,7,8-HpCDF	ND	---	1.9	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	---	2.0	Equivalence: 0.0022 pg/L		
Total HpCDF	ND	---	2.0	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	ND	---	2.6			
Total HpCDD	ND	---	2.6			
OCDF	----	2.8	2.5 IJ			
OCDD	4.5	----	4.2 J			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).

EMPC = Estimated Maximum Possible Concentration

EDL = Estimated Detection Limit

J = Estimated value

I = Interference present

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2,3,7,8-TCDD Toxic Equivalency (TEQ) Calculations

Pace Analytical National

Client's Sample ID	DFBLKYI					
Lab Sample ID	BLANK-70738					
Filename	Y190529A_05					
Injected By	ZMS					
Total Amount Extracted	1000 mL		Matrix	Water		
% Moisture	NA	Dilution		NA		
Dry Weight Extracted	NA	Collected		05/22/2019 13:58		
ICAL ID	Y190424	Received		05/22/2019 13:58		
CCal Filename(s)	Y190529A_01	Extracted		05/23/2019 09:10		
Method Blank ID		Analyzed		05/29/2019 12:39		

Parameter	Conc pg/L	RL pg/L	WHO2005	LB	MB	UB
2,3,7,8-TCDF	ND	1.5	0.10000	0.0000	0.0762	0.1524
Total TCDF	ND	1.5	0.00000	0.0000	0.0000	0.0000
2,3,7,8-TCDD	ND	2.2	1.00000	0.0000	1.1177	2.2354
Total TCDD	ND	2.2	0.00000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDF	ND	2.0	0.03000	0.0000	0.0305	0.0610
2,3,4,7,8-PeCDF	ND	1.7	0.30000	0.0000	0.2542	0.5084
Total PeCDF	ND	1.9	0.00000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDD	ND	2.8	1.00000	0.0000	1.3912	2.7824
Total PeCDD	ND	2.8	0.00000	0.0000	0.0000	0.0000
1,2,3,4,7,8-HxCDF	ND	4.0	0.10000	0.0000	0.2006	0.4012
1,2,3,6,7,8-HxCDF	ND	3.5	0.10000	0.0000	0.1738	0.3477
2,3,4,6,7,8-HxCDF	ND	3.6	0.10000	0.0000	0.1804	0.3607
1,2,3,7,8,9-HxCDF	ND	3.1	0.10000	0.0000	0.1538	0.3076
Total HxCDF	ND	3.5	0.00000	0.0000	0.0000	0.0000
1,2,3,4,7,8-HxCDD	ND	7.3	0.10000	0.0000	0.3664	0.7328
1,2,3,6,7,8-HxCDD	ND	6.9	0.10000	0.0000	0.3430	0.6859
1,2,3,7,8,9-HxCDD	ND	7.8	0.10000	0.0000	0.3910	0.7820
Total HxCDD	ND	7.3	0.00000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HpCDF	ND	1.9	0.01000	0.0000	0.0097	0.0194
1,2,3,4,7,8,9-HpCDF	ND	2.0	0.01000	0.0000	0.0101	0.0202
Total HpCDF	ND	2.0	0.00000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HpCDD	ND	2.6	0.01000	0.0000	0.0131	0.0262
Total HpCDD	ND	2.6	0.00000	0.0000	0.0000	0.0000
OCDF	ND	2.5	0.00030	0.0008	0.0008	0.0008
OCDD	4.5	4.2	0.00030	0.0014	0.0014	0.0014

0.0022 pg/L 4.7 pg/L 9.4 pg/L

Final values are valid to only 2 significant figures

TEQs for Totals classes include contributions from non 2,3,7,8 isomers only

LB = Lower Bound, Where "ND", TEQ Conc = 0

MB = Medium Bound, Where "ND", TEQ Conc = (LOD/2) * (TEF Factor)

UB = Upper Bound, Where "ND", TEQ Conc = LOD * (TEF Factor)

RL = Reporting Limit

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Method 1613B Laboratory Control Spike Results

Lab Sample ID	LCS-70739	Matrix	Water
Filename	Y190529A_02	Dilution	NA
Total Amount Extracted	1000 mL	Extracted	05/23/2019 09:10
ICAL ID	Y190424	Analyzed	05/29/2019 10:25
CCal Filename	Y190529A_01	Injected By	ZMS
Method Blank ID	BLANK-70738		

Compound	Cs	Cr	Lower Limit	Upper Limit	% Rec.
2,3,7,8-TCDF	10	11	7.5	15.8	109
2,3,7,8-TCDD	10	12	6.7	15.8	121
1,2,3,7,8-PeCDF	50	53	40.0	67.0	105
2,3,4,7,8-PeCDF	50	52	34.0	80.0	105
1,2,3,7,8-PeCDD	50	50	35.0	71.0	100
1,2,3,4,7,8-HxCDF	50	53	36.0	67.0	107
1,2,3,6,7,8-HxCDF	50	50	42.0	65.0	100
2,3,4,6,7,8-HxCDF	50	51	35.0	78.0	102
1,2,3,7,8,9-HxCDF	50	50	39.0	65.0	100
1,2,3,4,7,8-HxCDD	50	57	35.0	82.0	113
1,2,3,6,7,8-HxCDD	50	56	38.0	67.0	112
1,2,3,7,8,9-HxCDD	50	58	32.0	81.0	116
1,2,3,4,6,7,8-HpCDF	50	55	41.0	61.0	110
1,2,3,4,7,8,9-HpCDF	50	50	39.0	69.0	100
1,2,3,4,6,7,8-HpCDD	50	50	35.0	70.0	100
OCDF	100	110	63.0	170.0	110
OCDD	100	110	78.0	144.0	114
2,3,7,8-TCDD-37Cl4	10	8.9	3.1	19.1	89
2,3,7,8-TCDF-13C	100	78	22.0	152.0	78
2,3,7,8-TCDD-13C	100	74	20.0	175.0	74
1,2,3,7,8-PeCDF-13C	100	83	21.0	192.0	83
2,3,4,7,8-PeCDF-13C	100	86	13.0	328.0	86
1,2,3,7,8-PeCDD-13C	100	88	21.0	227.0	88
1,2,3,4,7,8-HxCDF-13C	100	87	19.0	202.0	87
1,2,3,6,7,8-HxCDF-13C	100	91	21.0	159.0	91
2,3,4,6,7,8-HxCDF-13C	100	89	22.0	176.0	89
1,2,3,7,8,9-HxCDF-13C	100	90	17.0	205.0	90
1,2,3,4,7,8-HxCDD-13C	100	78	21.0	193.0	78
1,2,3,6,7,8-HxCDD-13C	100	73	25.0	163.0	73
1,2,3,4,6,7,8-HpCDF-13C	100	82	21.0	158.0	82
1,2,3,4,7,8,9-HpCDF-13C	100	92	20.0	186.0	92
1,2,3,4,6,7,8-HpCDD-13C	100	89	26.0	166.0	89
OCDD-13C	200	190	26.0	397.0	95

Cs = Concentration Spiked (ng/mL)

Cr = Concentration Recovered (ng/mL)

Rec. = Recovery (Expressed as Percent)

Control Limit Reference: Method 1613, Table 6, 10/94 Revision

R = Recovery outside of control limits

Nn = Value obtained from additional analysis

* = See Discussion

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Method 1613B Laboratory Control Spike Results

Lab Sample ID	LCSD-70740	Matrix	Water
Filename	Y190529A_03	Dilution	NA
Total Amount Extracted	989 mL	Extracted	05/23/2019 09:10
ICAL ID	Y190424	Analyzed	05/29/2019 11:10
CCal Filename	Y190529A_01	Injected By	ZMS
Method Blank ID	BLANK-70738		

Compound	Cs	Cr	Lower Limit	Upper Limit	% Rec.
2,3,7,8-TCDF	10	10	7.5	15.8	103
2,3,7,8-TCDD	10	11	6.7	15.8	114
1,2,3,7,8-PeCDF	50	49	40.0	67.0	98
2,3,4,7,8-PeCDF	50	51	34.0	80.0	102
1,2,3,7,8-PeCDD	50	48	35.0	71.0	95
1,2,3,4,7,8-HxCDF	50	52	36.0	67.0	103
1,2,3,6,7,8-HxCDF	50	49	42.0	65.0	98
2,3,4,6,7,8-HxCDF	50	49	35.0	78.0	97
1,2,3,7,8,9-HxCDF	50	48	39.0	65.0	96
1,2,3,4,7,8-HxCDD	50	54	35.0	82.0	108
1,2,3,6,7,8-HxCDD	50	55	38.0	67.0	110
1,2,3,7,8,9-HxCDD	50	56	32.0	81.0	112
1,2,3,4,6,7,8-HpCDF	50	55	41.0	61.0	110
1,2,3,4,7,8,9-HpCDF	50	49	39.0	69.0	98
1,2,3,4,6,7,8-HpCDD	50	51	35.0	70.0	102
OCDF	100	99	63.0	170.0	99
OCDD	100	110	78.0	144.0	108
2,3,7,8-TCDD-37Cl4	10	8.7	3.1	19.1	87
2,3,7,8-TCDF-13C	100	73	22.0	152.0	73
2,3,7,8-TCDD-13C	100	70	20.0	175.0	70
1,2,3,7,8-PeCDF-13C	100	79	21.0	192.0	79
2,3,4,7,8-PeCDF-13C	100	81	13.0	328.0	81
1,2,3,7,8-PeCDD-13C	100	84	21.0	227.0	84
1,2,3,4,7,8-HxCDF-13C	100	81	19.0	202.0	81
1,2,3,6,7,8-HxCDF-13C	100	83	21.0	159.0	83
2,3,4,6,7,8-HxCDF-13C	100	83	22.0	176.0	83
1,2,3,7,8,9-HxCDF-13C	100	82	17.0	205.0	82
1,2,3,4,7,8-HxCDD-13C	100	74	21.0	193.0	74
1,2,3,6,7,8-HxCDD-13C	100	67	25.0	163.0	67
1,2,3,4,6,7,8-HpCDF-13C	100	73	21.0	158.0	73
1,2,3,4,7,8,9-HpCDF-13C	100	80	20.0	186.0	80
1,2,3,4,6,7,8-HpCDD-13C	100	78	26.0	166.0	78
OCDD-13C	200	180	26.0	397.0	91

Cs = Concentration Spiked (ng/mL)

Cr = Concentration Recovered (ng/mL)

Rec. = Recovery (Expressed as Percent)

Control Limit Reference: Method 1613, Table 6, 10/94 Revision

R = Recovery outside of control limits

Nn = Value obtained from additional analysis

* = See Discussion

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1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Method 1613B

Spike Recovery Relative Percent Difference (RPD) Results

Client Pace Analytical National

Spike 1 ID LCS-70739 Spike 2 ID LCSD-70740
Spike 1 Filename Y190529A_02 Spike 2 Filename Y190529A_03

Compound	Spike 1 %REC	Spike 2 %REC	%RPD
2,3,7,8-TCDF	109	103	5.7
2,3,7,8-TCDD	121	114	6.0
1,2,3,7,8-PeCDF	105	98	6.9
2,3,4,7,8-PeCDF	105	102	2.9
1,2,3,7,8-PeCDD	100	95	5.1
1,2,3,4,7,8-HxCDF	107	103	3.8
1,2,3,6,7,8-HxCDF	100	98	2.0
2,3,4,6,7,8-HxCDF	102	97	5.0
1,2,3,7,8,9-HxCDF	100	96	4.1
1,2,3,4,7,8-HxCDD	113	108	4.5
1,2,3,6,7,8-HxCDD	112	110	1.8
1,2,3,7,8,9-HxCDD	116	112	3.5
1,2,3,4,6,7,8-HpCDF	110	110	0.0
1,2,3,4,7,8,9-HpCDF	100	98	2.0
1,2,3,4,6,7,8-HpCDD	100	102	2.0
OCDF	110	99	10.5
OCDD	114	108	5.4

%REC = Percent Recovered

RPD = The difference between the two values divided by the mean value

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Method 1613B
Initial Calibration (ICAL) - Response Factor Summary

ICAL ID	F190508	Data Files:			Time	Injected
Calibration Date	05/08/2019	CS-1	F190508A_04	11:43	SMT	
Instrument	10MSHR05 (F)	CS-2	F190508A_03	11:02	SMT	
Column Phase	ZB5-MS 0.25mm	CS-3	F190508A_02	10:00	SMT	
Column ID No.	ZB5-MS-629919	CS-4	F190508A_06	13:46	SMT	
		CS-5	F190508A_05	13:05	SMT	
Isomer		CS-1	CS-2	CS-3	CS-4	CS-5
					Ave RF	%RSD
2,3,7,8-TCDF		0.8288	0.8067	0.8548	0.9247	0.8692
2,3,7,8-TCDD		0.7258	0.7466	0.9053	0.8472	0.8226
1,2,3,7,8-PeCDF		0.7848	0.8155	0.9265	0.9294	0.9605
2,3,4,7,8-PeCDF		0.9141	0.9583	1.0049	1.0616	1.0418
1,2,3,7,8-PeCDD		0.7512	0.7742	0.8516	0.8895	0.8836
1,2,3,4,7,8-HxCDF		1.0236	1.1127	1.1608	1.1726	1.2089
1,2,3,6,7,8-HxCDF		1.0014	1.0246	1.1187	1.1501	1.1270
2,3,4,6,7,8-HxCDF		1.0507	1.1409	1.1858	1.2495	1.2346
1,2,3,7,8,9-HxCDF		0.9781	1.0316	1.0873	1.1379	1.1166
1,2,3,4,7,8-HxCDD		0.8555	0.8687	0.9233	0.9402	0.9573
1,2,3,6,7,8-HxCDD		0.8314	0.9043	0.9052	0.9359	0.9026
1,2,3,7,8,9-HxCDD		0.8565	0.8763	0.9003	0.9266	0.9153
1,2,3,4,6,7,8-HpCDF		1.1049	1.1654	1.1997	1.2823	1.2449
1,2,3,4,7,8,9-HpCDF		1.1387	1.1656	1.2257	1.2892	1.2353
1,2,3,4,6,7,8-HpCDD		0.8917	0.9372	0.9719	1.0276	1.0178
OCDF		0.9256	0.9767	0.9981	1.0986	1.0703
OCDD		0.8835	0.9641	0.9292	0.9824	0.9725
Total PeCDF		0.8494	0.8869	0.9657	0.9955	1.0012
Total HxCDF		1.0134	1.0775	1.1381	1.1775	1.1718
Total HxCDD		0.8478	0.8831	0.9096	0.9343	0.9362
Total HpCDF		1.1218	1.1655	1.2127	1.2857	1.2401
2,3,7,8-TCDF-13C		1.2774	1.2742	1.2612	1.2461	1.2611
2,3,7,8-TCDD-13C		1.0321	1.0459	1.0771	1.0111	1.0470
2,3,7,8-TCDD-37Cl4		0.8169	0.9323	0.9533	0.9783	1.0309
1,2,3,7,8-PeCDF-13C		1.0537	1.0775	1.0227	1.0200	1.0592
2,3,4,7,8-PeCDF-13C		1.0512	1.0726	1.0678	1.0115	1.0827
1,2,3,7,8-PeCDD-13C		0.7608	0.7921	0.7924	0.7409	0.7983
1,2,3,4,7,8-HxCDF-13C		1.1556	1.0886	0.9809	1.1450	1.1002
1,2,3,6,7,8-HxCDF-13C		1.2681	1.2256	1.0928	1.2756	1.2214
2,3,4,6,7,8-HxCDF-13C		1.1349	1.0734	0.9911	1.1211	1.0874
1,2,3,7,8,9-HxCDF-13C		1.0058	0.9854	0.8807	0.9933	0.9866
1,2,3,4,7,8-HxCDD-13C		1.0164	0.9810	0.8696	1.0258	1.0080
1,2,3,6,7,8-HxCDD-13C		1.1202	1.1043	1.0208	1.1355	1.1310
1,2,3,4,6,7,8-HpCDF-13C		1.2491	1.2217	1.0875	1.2280	1.2341
1,2,3,4,7,8,9-HpCDF-13C		0.9880	1.0006	0.8771	0.9634	1.0185
1,2,3,4,6,7,8-HpCDD-13C		1.0980	1.0766	0.9822	1.0556	1.0983
OCDD-13C		0.9188	0.9233	0.8338	0.9071	0.9535

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Method 1613B
Initial Calibration (ICAL) - Isotope Ratio Summary

ICAL ID	F190508	Data Files:	Time	Injected
Calibration Date	05/08/2019	CS-1	F190508A_04	11:43
Instrument	10MSHR05 (F)	CS-2	F190508A_03	11:02
Column Phase	ZB5-MS 0.25mm	CS-3	F190508A_02	10:00
Column ID No.	ZB5-MS-629919	CS-4	F190508A_06	13:46
		CS-5	F190508A_05	13:05

Isomer	CS-1	CS-2	CS-3	CS-4	CS-5	Limits
2,3,7,8-TCDF	0.76	0.79	0.75	0.76	0.78	0.65 - 0.89
2,3,7,8-TCDD	0.79	0.75	0.82	0.76	0.78	0.65 - 0.89
1,2,3,7,8-PeCDF	1.54	1.53	1.61	1.54	1.58	1.32 - 1.78
2,3,4,7,8-PeCDF	1.53	1.60	1.54	1.55	1.54	1.32 - 1.78
1,2,3,7,8-PeCDD	0.55	0.62	0.61	0.61	0.62	0.52 - 0.70
1,2,3,4,7,8-HxCDF	1.30	1.29	1.28	1.26	1.24	1.05 - 1.43
1,2,3,6,7,8-HxCDF	1.22	1.30	1.21	1.26	1.24	1.05 - 1.43
2,3,4,6,7,8-HxCDF	1.27	1.19	1.22	1.24	1.23	1.05 - 1.43
1,2,3,7,8,9-HxCDF	1.43	1.23	1.26	1.21	1.23	1.05 - 1.43
1,2,3,4,7,8-HxCDD	1.26	1.33	1.23	1.24	1.24	1.05 - 1.43
1,2,3,6,7,8-HxCDD	1.23	1.25	1.21	1.22	1.22	1.05 - 1.43
1,2,3,7,8,9-HxCDD	1.25	1.26	1.21	1.22	1.19	1.05 - 1.43
1,2,3,4,6,7,8-HpCDF	1.05	1.00	1.01	1.02	1.03	0.88 - 1.20
1,2,3,4,7,8,9-HpCDF	0.94	1.06	1.03	1.03	1.03	0.88 - 1.20
1,2,3,4,6,7,8-HpCDD	0.95	1.04	1.00	1.00	1.04	0.88 - 1.20
OCDF	0.94	0.93	0.91	0.90	0.92	0.76 - 1.02
OCDD	0.86	0.86	0.88	0.89	0.88	0.76 - 1.02
1,2,3,4-TCDD-13C	0.79	0.79	0.79	0.78	0.78	0.65 - 0.89
1,2,3,7,8,9-HxCDD-13C	1.25	1.24	1.25	1.24	1.21	1.05 - 1.43
2,3,7,8-TCDF-13C	0.76	0.77	0.78	0.75	0.77	0.65 - 0.89
2,3,7,8-TCDD-13C	0.77	0.78	0.78	0.77	0.77	0.65 - 0.89
1,2,3,7,8-PeCDF-13C	1.61	1.56	1.57	1.56	1.57	1.32 - 1.78
2,3,4,7,8-PeCDD-13C	1.54	1.57	1.58	1.56	1.57	1.32 - 1.78
1,2,3,7,8-PeCDF-13C	1.56	1.58	1.56	1.58	1.54	1.32 - 1.78
1,2,3,4,7,8-HxCDF-13C	0.52	0.51	0.51	0.52	0.52	0.43 - 0.59
1,2,3,6,7,8-HxCDF-13C	0.54	0.51	0.50	0.53	0.52	0.43 - 0.59
2,3,4,6,7,8-HxCDF-13C	0.52	0.51	0.53	0.53	0.53	0.43 - 0.59
1,2,3,7,8,9-HxCDF-13C	0.51	0.53	0.53	0.54	0.52	0.43 - 0.59
1,2,3,4,7,8-HxCDD-13C	1.24	1.26	1.25	1.26	1.24	1.05 - 1.43
1,2,3,6,7,8-HxCDD-13C	1.26	1.25	1.25	1.26	1.23	1.05 - 1.43
1,2,3,4,6,7,8-HpCDF-13C	0.45	0.43	0.44	0.45	0.44	0.37 - 0.51
1,2,3,4,7,8-HpCDF-13C	0.45	0.44	0.45	0.45	0.44	0.37 - 0.51
1,2,3,4,6,7,8-HpCDD-13C	1.01	1.03	1.03	1.03	1.06	0.88 - 1.20
OCDD-13C	0.89	0.91	0.88	0.91	0.90	0.76 - 1.02

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Method 1613B
Initial Calibration (ICAL) - Response Factor Summary

ICAL ID	Y190424	Data Files:			Time	Injected
Calibration Date	04/24/2019	CS-1	Y190424A_03	09:24	SMT	
Instrument	10MSHR12 (Y)	CS-2	Y190424A_02	08:38	SMT	
Column Phase	ZB-5MS 0.25mm	CS-3	Y190424A_01	07:53	SMT	
Column ID No.	629920	CS-4	Y190424A_05	11:02	SMT	
		CS-5	Y190424A_04	10:17	SMT	
Isomer		CS-1	CS-2	CS-3	CS-4	CS-5
					Ave RF	%RSD
2,3,7,8-TCDF		0.8729	0.8432	0.8526	0.8809	0.8677
2,3,7,8-TCDD		0.8562	0.8631	1.0213	0.9314	0.9243
1,2,3,7,8-PeCDF		0.8497	0.8338	0.9059	0.8703	0.8977
2,3,4,7,8-PeCDF		0.9341	0.9523	0.9597	0.9958	1.0220
1,2,3,7,8-PeCDD		0.8708	0.8847	0.8802	0.8955	0.9296
1,2,3,4,7,8-HxCDF		1.1439	1.0967	1.1776	1.1920	1.2166
1,2,3,6,7,8-HxCDF		1.0426	1.0679	1.1267	1.1055	1.1348
2,3,4,6,7,8-HxCDF		1.1427	1.1191	1.1823	1.1952	1.1819
1,2,3,7,8,9-HxCDF		1.1115	1.0464	1.0803	1.1213	1.1439
1,2,3,4,7,8-HxCDD		0.8497	0.8896	0.9286	0.9506	0.9602
1,2,3,6,7,8-HxCDD		0.9208	0.9452	0.9241	0.9304	0.9459
1,2,3,7,8,9-HxCDD		0.8968	0.8994	0.9503	0.9396	0.9360
1,2,3,4,6,7,8-HpCDF		1.2000	1.2714	1.2416	1.2860	1.2831
1,2,3,4,7,8,9-HpCDF		1.2820	1.2744	1.2895	1.3181	1.3172
1,2,3,4,6,7,8-HpCDD		0.9267	0.9265	0.9872	1.0193	0.9930
OCDF		1.1150	1.0519	1.0618	1.1832	1.1582
OCDD		0.9688	0.9932	0.9766	1.0446	1.0045
Total PeCDF		0.8919	0.8930	0.9328	0.9331	0.9599
Total HxCDF		1.1101	1.0825	1.1417	1.1535	1.1693
Total HxCDD		0.8891	0.9114	0.9343	0.9402	0.9473
Total HpCDF		1.2410	1.2729	1.2655	1.3020	1.3002
2,3,7,8-TCDF-13C		1.4049	1.4326	1.4451	1.3939	1.4340
2,3,7,8-TCDD-13C		1.0663	1.1017	1.1494	1.0553	1.1115
2,3,7,8-TCDD-37Cl4		1.0375	1.0723	1.1203	1.0857	1.1501
1,2,3,7,8-PeCDF-13C		1.0503	1.0587	1.0139	1.0630	1.1470
2,3,4,7,8-PeCDF-13C		1.0164	1.0405	1.0773	1.0337	1.1320
1,2,3,7,8-PeCDD-13C		0.7177	0.7227	0.7651	0.7403	0.8302
1,2,3,4,7,8-HxCDF-13C		1.0423	1.0440	0.8810	1.0422	0.9857
1,2,3,6,7,8-HxCDF-13C		1.1538	1.1790	0.9850	1.1883	1.1393
2,3,4,6,7,8-HxCDF-13C		1.1032	1.0959	0.9475	1.1004	1.0598
1,2,3,7,8,9-HxCDF-13C		0.9479	0.9666	0.8920	0.9829	0.9583
1,2,3,4,7,8-HxCDD-13C		0.9555	0.9770	0.8521	0.9886	0.9648
1,2,3,6,7,8-HxCDD-13C		1.0622	1.0827	0.9902	1.0797	1.0742
1,2,3,4,6,7,8-HpCDF-13C		1.0365	1.0626	0.9680	1.0737	1.0649
1,2,3,4,7,8,9-HpCDF-13C		0.8316	0.8411	0.7866	0.8572	0.8769
1,2,3,4,6,7,8-HpCDD-13C		0.8976	0.9280	0.8651	0.9239	0.9580
OCDD-13C		0.6505	0.6988	0.6782	0.7086	0.7707
						0.7014
						6.37

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Method 1613B
Initial Calibration (ICAL) - Isotope Ratio Summary

ICAL ID	Y190424	Data Files:	Time	Injected	
Calibration Date	04/24/2019	CS-1	Y190424A_03	09:24	SMT
Instrument	10MSHR12 (Y)	CS-2	Y190424A_02	08:38	SMT
Column Phase	ZB-5MS 0.25mm	CS-3	Y190424A_01	07:53	SMT
Column ID No.	629920	CS-4	Y190424A_05	11:02	SMT
		CS-5	Y190424A_04	10:17	SMT

Isomer	CS-1	CS-2	CS-3	CS-4	CS-5	Limits
2,3,7,8-TCDF	0.83	0.83	0.77	0.77	0.78	0.65 - 0.89
2,3,7,8-TCDD	0.83	0.80	0.76	0.77	0.77	0.65 - 0.89
1,2,3,7,8-PeCDF	1.43	1.56	1.53	1.53	1.55	1.32 - 1.78
2,3,4,7,8-PeCDF	1.53	1.60	1.54	1.59	1.56	1.32 - 1.78
1,2,3,7,8-PeCDD	0.65	0.62	0.61	0.60	0.61	0.52 - 0.70
1,2,3,4,7,8-HxCDF	1.26	1.27	1.26	1.27	1.27	1.05 - 1.43
1,2,3,6,7,8-HxCDF	1.26	1.30	1.26	1.27	1.29	1.05 - 1.43
2,3,4,6,7,8-HxCDF	1.26	1.27	1.26	1.28	1.25	1.05 - 1.43
1,2,3,7,8,9-HxCDF	1.16	1.18	1.26	1.25	1.26	1.05 - 1.43
1,2,3,4,7,8-HxCDD	1.18	1.22	1.24	1.24	1.22	1.05 - 1.43
1,2,3,6,7,8-HxCDD	1.30	1.26	1.25	1.23	1.23	1.05 - 1.43
1,2,3,7,8,9-HxCDD	1.31	1.24	1.26	1.23	1.22	1.05 - 1.43
1,2,3,4,6,7,8-HpCDF	1.14	1.11	1.04	1.04	1.03	0.88 - 1.20
1,2,3,4,7,8,9-HpCDF	0.96	1.11	1.00	1.05	1.02	0.88 - 1.20
1,2,3,4,6,7,8-HpCDD	1.03	1.05	1.05	1.03	1.05	0.88 - 1.20
OCDF	0.85	0.88	0.91	0.87	0.90	0.76 - 1.02
OCDD	0.76	0.91	0.88	0.88	0.89	0.76 - 1.02
1,2,3,4-TCDD-13C	0.78	0.78	0.79	0.78	0.80	0.65 - 0.89
1,2,3,7,8,9-HxCDD-13C	1.24	1.25	1.23	1.25	1.24	1.05 - 1.43
2,3,7,8-TCDF-13C	0.79	0.78	0.76	0.76	0.77	0.65 - 0.89
2,3,7,8-TCDD-13C	0.79	0.77	0.79	0.78	0.78	0.65 - 0.89
1,2,3,7,8-PeCDF-13C	1.53	1.56	1.55	1.56	1.57	1.32 - 1.78
2,3,4,7,8-PeCDF-13C	1.54	1.54	1.55	1.57	1.55	1.32 - 1.78
1,2,3,7,8-PeCDD-13C	1.56	1.55	1.59	1.59	1.61	1.32 - 1.78
1,2,3,4,7,8-HxCDF-13C	0.52	0.51	0.52	0.51	0.52	0.43 - 0.59
1,2,3,6,7,8-HxCDF-13C	0.52	0.51	0.54	0.51	0.51	0.43 - 0.59
2,3,4,6,7,8-HxCDF-13C	0.51	0.52	0.50	0.51	0.51	0.43 - 0.59
1,2,3,7,8,9-HxCDF-13C	0.52	0.53	0.52	0.50	0.50	0.43 - 0.59
1,2,3,4,7,8-HxCDD-13C	1.26	1.25	1.25	1.26	1.26	1.05 - 1.43
1,2,3,6,7,8-HxCDD-13C	1.23	1.21	1.22	1.25	1.24	1.05 - 1.43
1,2,3,4,6,7,8-HpCDF-13C	0.45	0.45	0.45	0.44	0.44	0.37 - 0.51
1,2,3,4,7,8-HpCDF-13C	0.44	0.45	0.46	0.44	0.45	0.37 - 0.51
1,2,3,4,6,7,8-HpCDD-13C	1.04	1.01	1.04	1.03	1.03	0.88 - 1.20
OCDD-13C	0.88	0.91	0.89	0.88	0.89	0.76 - 1.02

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**Method 1613B Analysis Results
PCDD/PCDF Calibration Verification
Labeled Analytes**

Lab Name CS3/CPM-11321-155
Filename Y190529A_01
Injected By ZMS
Analyzed 05/29/2019 09:27

Instrument ID 10MSHR12 (Y)
GC Column ID 629920
ICAL ID Y190424

Native Isomers	m/z's Forming Ratio (1)	Ion Abund. Ratio	QC Limits (2)	Conc Found	Conc. Range (ng/ml) (3)
Labeled Compounds					
1,2,3,4-TCDD-13C	M/M+2	0.80	0.65 - 0.89	----	----
2,3,7,8-TCDD-13C	M/M+2	0.79	0.65 - 0.89	103.1	82 - 121
1,2,3,7,8-PeCDD-13C	M+2/M+4	1.55	1.32 - 1.78	99.9	62 - 160
1,2,3,4,7,8-HxCDD-13C	M+2/M+4	1.26	1.05 - 1.43	95.7	85 - 117
1,2,3,6,7,8-HxCDD-13C	M+2/M+4	1.24	1.05 - 1.43	90.7	85 - 118
1,2,3,7,8,9-HxCDD-13C	M+2/M+4	1.22	1.05 - 1.43	----	----
1,2,3,4,6,7,8-HpCDD-13C	M+2/M+4	1.04	0.88 - 1.20	105.4	72 - 138
OCDD-13C	M+2/M+4	0.93	0.76 - 1.02	238.3	96 - 415
2,3,7,8-TCDF-13C	M/M+2	0.77	0.65 - 0.89	103.8	71 - 140
1,2,3,7,8-PeCDF-13C	M+2/M+4	1.57	1.32 - 1.78	99.2	76 - 130
2,3,4,7,8-PeCDF-13C	M+2/M+4	1.58	1.32 - 1.78	105.8	77 - 130
1,2,3,4,7,8-HxCDF-13C	M/M+2	0.52	0.43 - 0.59	105.8	76 - 131
1,2,3,6,7,8-HxCDF-13C	M/M+2	0.52	0.43 - 0.59	101.9	70 - 143
2,3,4,6,7,8-HxCDF-13C	M/M+2	0.51	0.43 - 0.59	99.6	73 - 137
1,2,3,7,8,9-HxCDF-13C	M/M+2	0.50	0.43 - 0.59	106.9	74 - 135
1,2,3,4,6,7,8-HpCDF-13C	M/M+2	0.47	0.37 - 0.51	102.0	78 - 129
1,2,3,4,7,8,9-HpCDF-13C	M/M+2	0.46	0.37 - 0.51	109.8	77 - 129
Cleanup Standard					
2,3,7,8-TCDD-37Cl4	M+2/M+4	(4)		10.2	7.9 - 12.7

1. See Table 8, Method 1613, for m/z specifications.
2. Ion Abundance Ratio Control Limits from Table 9, Method 1613.
3. Contract-required concentration range as specified in Table 6, Method 1613, under VER (10/94 Revision).
4. No ion abundance ratio; report concentration found.

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**Method 1613B Analysis Results
PCDD/PCDF Calibration Verification
Native Analytes**

Lab Name CS3/CPM-11321-155
Filename Y190529A_01
Injected By ZMS
Analyzed 05/29/2019 09:27

Instrument ID 10MSHR12 (Y)
GC Column ID 629920
ICAL ID Y190424

Native Isomers	m/z's Forming Ratio (1)	Ion Abund. Ratio	QC Limits (2)	Conc Found	Conc. Range (ng/ml) (3)
2,3,7,8-TCDD	M/M+2	0.77	0.65 - 0.89	11.6	7.8 - 12.9
1,2,3,7,8-PeCDD	M+2/M+4	0.62	0.52 - 0.70	51.5	39 - 65
1,2,3,4,7,8-HxCDD	M+2/M+4	1.23	1.05 - 1.43	52.0	39 - 64
1,2,3,6,7,8-HxCDD	M+2/M+4	1.28	1.05 - 1.43	52.7	39 - 64
1,2,3,7,8,9-HxCDD	M+2/M+4	1.22	1.05 - 1.43	54.3	41 - 61
1,2,3,4,6,7,8-HpCDD	M+2/M+4	1.05	0.88 - 1.20	52.5	43 - 58
OCDD	M+2/M+4	0.94	0.76 - 1.02	102.7	79 - 126
2,3,7,8-TCDF	M/M+2	0.76	0.65 - 0.89	10.5	8.4 - 12.0
1,2,3,7,8-PeCDF	M+2/M+4	1.63	1.32 - 1.78	54.4	41 - 60
2,3,4,7,8-PeCDF	M+2/M+4	1.60	1.32 - 1.78	50.9	41 - 61
1,2,3,4,7,8-HxCDF	M+2/M+4	1.28	1.05 - 1.43	49.5	45 - 56
1,2,3,6,7,8-HxCDF	M+2/M+4	1.26	1.05 - 1.43	50.7	44 - 57
2,3,4,6,7,8-HxCDF	M+2/M+4	1.24	1.05 - 1.43	51.4	44 - 57
1,2,3,7,8,9-HxCDF	M+2/M+4	1.27	1.05 - 1.43	49.6	45 - 56
1,2,3,4,6,7,8-HpCDF	M+2/M+4	1.06	0.88 - 1.20	52.0	45 - 55
1,2,3,4,7,8,9-HpCDF	M+2/M+4	1.06	0.88 - 1.20	52.3	43 - 58
OCDF	M+2/M+4	0.90	0.76 - 1.02	108.5	63 - 159

1. See Table 8, Method 1613, for m/z specifications.
2. Ion Abundance Ratio Control Limits from Table 9, Method 1613.
3. Contract-required concentration range as specified in Table 6, Method 1613, under VER (10/94 Revision).

REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

**Method 1613B Analysis Results
PCDD/PCDF Calibration Verification
Labeled Analytes**

Lab Name CS3/CPM-11321-155
Filename F190529B_14
Injected By SMT
Analyzed 05/29/2019 19:30

Instrument ID 10MSHR05 (F)
GC Column ID ZB5-MS-629919
ICAL ID F190508

Native Isomers	m/z's Forming Ratio (1)	Ion Abund. Ratio	QC Limits (2)	Conc Found	Conc. Range (ng/ml) (3)
Labeled Compounds					
1,2,3,4-TCDD-13C	M/M+2	0.78	0.65 - 0.89	----	----
2,3,7,8-TCDD-13C	M/M+2	0.76	0.65 - 0.89	101.5	82 - 121
1,2,3,7,8-PeCDD-13C	M+2/M+4	1.61	1.32 - 1.78	92.7	62 - 160
1,2,3,4,7,8-HxCDD-13C	M+2/M+4	1.24	1.05 - 1.43	90.9	85 - 117
1,2,3,6,7,8-HxCDD-13C	M+2/M+4	1.26	1.05 - 1.43	86.6	85 - 118
1,2,3,7,8,9-HxCDD-13C	M+2/M+4	1.25	1.05 - 1.43	----	----
1,2,3,4,6,7,8-HpCDD-13C	M+2/M+4	1.09	0.88 - 1.20	86.6	72 - 138
OCDD-13C	M+2/M+4	0.90	0.76 - 1.02	161.7	96 - 415
2,3,7,8-TCDF-13C	M/M+2	0.76	0.65 - 0.89	100.8	71 - 140
1,2,3,7,8-PeCDF-13C	M+2/M+4	1.60	1.32 - 1.78	94.6	76 - 130
2,3,4,7,8-PeCDF-13C	M+2/M+4	1.62	1.32 - 1.78	96.0	77 - 130
1,2,3,4,7,8-HxCDF-13C	M/M+2	0.52	0.43 - 0.59	93.8	76 - 131
1,2,3,6,7,8-HxCDF-13C	M/M+2	0.53	0.43 - 0.59	90.7	70 - 143
2,3,4,6,7,8-HxCDF-13C	M/M+2	0.53	0.43 - 0.59	93.8	73 - 137
1,2,3,7,8,9-HxCDF-13C	M/M+2	0.51	0.43 - 0.59	90.5	74 - 135
1,2,3,4,6,7,8-HpCDF-13C	M/M+2	0.45	0.37 - 0.51	83.0	78 - 129
1,2,3,4,7,8,9-HpCDF-13C	M/M+2	0.46	0.37 - 0.51	78.6	77 - 129
Cleanup Standard					
2,3,7,8-TCDD-37Cl4	M+2/M+4	(4)		10.0	7.9 - 12.7

1. See Table 8, Method 1613, for m/z specifications.
2. Ion Abundance Ratio Control Limits from Table 9, Method 1613.
3. Contract-required concentration range as specified in Table 6, Method 1613, under VER (10/94 Revision).
4. No ion abundance ratio; report concentration found.

REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

**Method 1613B Analysis Results
PCDD/PCDF Calibration Verification
Native Analytes**

Lab Name CS3/CPM-11321-155
Filename F190529B_14
Injected By SMT
Analyzed 05/29/2019 19:30

Instrument ID 10MSHR05 (F)
GC Column ID ZB5-MS-629919
ICAL ID F190508

Native Isomers	m/z's Forming Ratio (1)	Ion Abund. Ratio	QC Limits (2)	Conc Found	Conc. Range (ng/ml) (3)
2,3,7,8-TCDD	M/M+2	0.77	0.65 - 0.89	11.0	7.8 - 12.9
1,2,3,7,8-PeCDD	M+2/M+4	0.62	0.52 - 0.70	51.9	39 - 65
1,2,3,4,7,8-HxCDD	M+2/M+4	1.20	1.05 - 1.43	51.2	39 - 64
1,2,3,6,7,8-HxCDD	M+2/M+4	1.25	1.05 - 1.43	52.0	39 - 64
1,2,3,7,8,9-HxCDD	M+2/M+4	1.22	1.05 - 1.43	53.6	41 - 61
1,2,3,4,6,7,8-HpCDD	M+2/M+4	1.03	0.88 - 1.20	49.8	43 - 58
OCDD	M+2/M+4	0.86	0.76 - 1.02	98.5	79 - 126
2,3,7,8-TCDF	M/M+2	0.85	0.65 - 0.89	9.4	8.4 - 12.0
1,2,3,7,8-PeCDF	M+2/M+4	1.53	1.32 - 1.78	52.7	41 - 60
2,3,4,7,8-PeCDF	M+2/M+4	1.60	1.32 - 1.78	51.2	41 - 61
1,2,3,4,7,8-HxCDF	M+2/M+4	1.23	1.05 - 1.43	49.7	45 - 56
1,2,3,6,7,8-HxCDF	M+2/M+4	1.27	1.05 - 1.43	49.6	44 - 57
2,3,4,6,7,8-HxCDF	M+2/M+4	1.27	1.05 - 1.43	50.5	44 - 57
1,2,3,7,8,9-HxCDF	M+2/M+4	1.25	1.05 - 1.43	52.3	45 - 56
1,2,3,4,6,7,8-HpCDF	M+2/M+4	1.02	0.88 - 1.20	51.0	45 - 55
1,2,3,4,7,8,9-HpCDF	M+2/M+4	1.06	0.88 - 1.20	51.2	43 - 58
OCDF	M+2/M+4	0.91	0.76 - 1.02	97.0	63 - 159

1. See Table 8, Method 1613, for m/z specifications.
2. Ion Abundance Ratio Control Limits from Table 9, Method 1613.
3. Contract-required concentration range as specified in Table 6, Method 1613, under VER (10/94 Revision).

REPORT OF LABORATORY ANALYSIS

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Report Prepared for:

Benita Miller
Pace Analytical National
12065 Lebanon Road
Mount Juliet TN 37122

**REPORT OF
LABORATORY
ANALYSIS
FOR PFAAs**

Report Prepared Date:

June 10, 2019

Report Information:

Pace Project #: 10475346

Sample Receipt Date: 05/17/2019

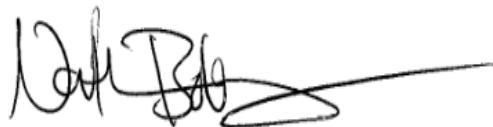
Client Project #: L1099017: WG1282167 PFA

Client Sub PO #: L1099017

State Cert #: 2926.01

Invoicing & Reporting Options:

This report has been reviewed by:



June 10, 2019

Nathan Boberg, Project Manager
612-360-0728
(612) 607-6444 (fax)
nathan.boberg@pacelabs.com



Report of Laboratory Analysis

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The results relate only to the samples included in this report.

DISCUSSION

This report presents the results from the analyses performed on one sample submitted by a representative of Pace-National. The sample was analyzed for one perfluorinated compound using a modified version of USEPA Method 537. Reporting limit was set to the quantitation limit.

A laboratory method blank was prepared and analyzed with the sample batch as part of our routine quality control procedures. The results show the blank was free of the target perfluorinated compound at the reporting limit. This indicates that the sample processing procedures did not significantly contribute to the analyte content determined for the sample material.

Laboratory spike samples were also prepared with the sample batch using clean reference matrix that had been fortified with native standards. The recovery results were within the method limits. The RPDs (relative percent differences) between one designated spike and its duplicate were within the method limits. These spikes indicate that extraction performed as expected.

The recoveries of the isotopically-labeled surrogate standards in the sample extract was within the target ranges specified in the method.

It should be noted that Pace Analytical has not yet completed the certification process for all analytes in this method. Therefore, the results have been marked "N2" as qualified. Results for the low level spikes that were below the calibration range were flagged "J".



Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Minnesota Laboratory Certifications

Authority	Certificate #	Authority	Certificate #
A2LA	2926.01	Minnesota - Pet	1240
Alabama	40770	Mississippi	MN00064
Alaska - DW	MN00064	Missouri - DW	10100
Alaska - UST	17-009	Montana	CERT0092
Arizona	AZ0014	Nebraska	NE-OS-18-06
Arkansas - DW	MN00064	Nevada	MN00064
Arkansas - WW	88-0680	New Hampshire	2081
CNMI Saipan	MP0003	New Jersey (NE)	MN002
California	2929	New York	11647
Colorado	MN00064	North Carolina	27700
Connecticut	PH-0256	North Carolina -	27700
EPA Region 8+	via MN 027-053	North Carolina -	530
Florida (NELAP)	E87605	North Dakota	R-036
Georgia	959	Ohio - DW	41244
Guam	17-001r	Ohio - VAP	CL101
Hawaii	MN00064	Oklahoma	9507
Idaho	MN00064	Oregon - Primar	MN300001
Illinois	200011	Oregon - Secon	MN200001
Indiana	C-MN-01	Pennsylvania	68-00563
Iowa	368	Puerto Rico	MN00064
Kansas	E-10167	South Carolina	74003
Kentucky - DW	90062	South Dakota	NA
Kentucky - WW	90062	Tennessee	TN02818
Louisiana - DE	03086	Texas	T104704192
Louisiana - DW	MN00064	Utah (NELAP)	MN00064
Maine	MN00064	Virginia	460163
Maryland	322	Washington	C486
Massachusetts	M-MN064	West Virginia -	382
Michigan	9909	West Virginia -	9952C
Minnesota	027-053-137	Wisconsin	999407970
Minnesota - De	via MN 027-053	Wyoming - UST	2926.01

REPORT OF LABORATORY ANALYSIS

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Reporting Flags

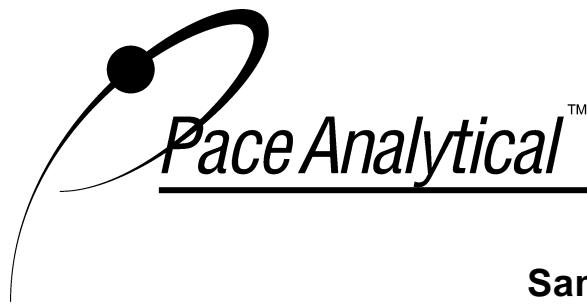
- A = Reporting Limit based on signal to noise
- B = Less than 10x higher than method blank level
- C = Result obtained from confirmation analysis
- D = Result obtained from analysis of diluted sample
- E = Exceeds calibration range
- I = Interference present
- J = Estimated value
- L = Suppressive interference, analyte may be biased low
- Nn = Value obtained from additional analysis
- P = PCDEInterference
- R = Recovery outside target range
- S = Peak saturated
- U = Analyte not detected
- V = Result verified by confirmation analysis
- X = %D Exceeds limits
- Y = Calculated using average of daily RFs
- * = See Discussion

REPORT OF LABORATORY ANALYSIS

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Appendix A

Sample Management



Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Sample ID Cross Reference

Client Sample ID

WW-20190513-002-DAY11

Pace Sample ID

10475346001

Date Received

05/17/2019

Sample Type

Water

REPORT OF LABORATORY ANALYSIS

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Reporting ID: 10475346_PFATA_DFR

Section A
Required Client Information:

Company: Pace Analytical National
Address: 12065 Lebanon Road
Mount Juliet, TN 37122
Email: SuboutTeam@pacenational.com
Phone: (615)773-9756 Fax: (615)758-5859
Requested Due Date: 30-May

Section B
Required Project Information:

Report To: Pace Analytical National Subout Team
Copy To:
Purchase Order #: L1099017
Project Name: N/A
Project #: N/A

Section C
Invoice Information:

Attention: Art Saunders
Company Name:
Address:
Pace Quote:
Pace Project Manager: Nathan Boberg
Pace Profile #: 38076

Page : 1 Of 1

Regulatory Agency

State / Location

DE

Requested Analysis Filtered (Y/N)

WO# : 10475346



10475346

Residual Chlorine (Y/N)

QC3 NEEDED

(2)(1)

ITEM #	SAMPLE ID <small>One Character per box. (A-Z, 0-9 /, -) Sample Ids must be unique</small>	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=CONT)	COLLECTED				SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives				Analyses Test	N/A			
				DATE	TIME	START	END			Unpreserved	H2SO4	NH3NH4	NaOH			Na2S2O3	Methanol	Other
1	WW-20190513-002-DAY11	WT			13-May	11:30		1					X	X				
2																		
10																		
11																		
12																		
ADDITIONAL COMMENTS				RELINQUISHED BY / AFFILIATION		DATE	TIME	ACCEPTED BY / AFFILIATION		DATE	TIME	SAMPLE CONDITIONS						
				Benita Miller		16-May	13:34	Carrie Pace		5/17/19	0845	1.1	Y	Y	Y			
Pace Analytical National Batch: WG1282167																		
Pace Analytical National SDGs: L1099017																		
Location: Minneapolis, MN 55414																		

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER:

SIGNATURE of SAMPLER:

DATE Signed:

TEMP in C	Received on
	Ice (Y/N)
	Custody Sealed (Y/N)
	Cooler Samples (Y/N)
	Impact (Y/N)

	Document Name: Sample Condition Upon Receipt Form	Document Revised: 09May2019 Page 1 of 1
	Document No.: F-MN-L-213-rev.28	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt	Client Name: <i>Pace National</i>	Project #: WO# : 10475346
Courier:	<input checked="" type="checkbox"/> Fed Ex <input type="checkbox"/> UPS <input type="checkbox"/> USPS <input type="checkbox"/> Client <input type="checkbox"/> Pace <input type="checkbox"/> SpeeDee <input type="checkbox"/> Commercial See Exception	PM: NB3 Due Date: 06/03/19 CLIENT: ESC_TN
Tracking Number:	<i>1023 1352 1175</i>	
Custody Seal on Cooler/Box Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Seals Intact? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Biological Tissue Frozen? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Packing Material:	<input type="checkbox"/> Bubble Wrap <input checked="" type="checkbox"/> Bubble Bags <input type="checkbox"/> None <input checked="" type="checkbox"/> Other: <i>PP</i>	Temp Blank? <input type="checkbox"/> Yes <input type="checkbox"/> No
Thermometer:	<input type="checkbox"/> T1(0461) <input type="checkbox"/> T2(1336) <input type="checkbox"/> T3(0459) <input checked="" type="checkbox"/> T4(0254) <input type="checkbox"/> T5(0489)	Type of Ice: <input checked="" type="checkbox"/> Wet <input type="checkbox"/> Blue <input type="checkbox"/> None <input type="checkbox"/> Dry <input type="checkbox"/> Melted
Note: Each West Virginia Sample must have temp taken (no temp blanks)		
Temp should be above freezing to 6°C	Cooler Temp Read w/temp blank: <i>0.9</i> °C	Average Corrected Temp See Exceptions (no temp blank only): <i>0.9</i> °C
Correction Factor: <i>+0.2</i>	Cooler Temp Corrected w/temp blank: <i>1.1</i> °C	
USDA Regulated Soil: (<input checked="" type="checkbox"/> N/A, water sample/Other: _____)	Date/Initials of Person Examining Contents: <i>CG 5/17/19</i>	
Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? <input type="checkbox"/> Yes <input type="checkbox"/> No
If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.		
COMMENTS:		
Chain of Custody Present and Filled Out?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	1.
Chain of Custody Relinquished?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	2.
Sampler Name and/or Signature on COC?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	3.
Samples Arrived within Hold Time?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	4.
Short Hold Time Analysis (<72 hr)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	5. <input type="checkbox"/> Fecal Coliform <input type="checkbox"/> HPC <input type="checkbox"/> Total Coliform/E. coli <input type="checkbox"/> BOD/cBOD <input type="checkbox"/> Hex Chrome <input type="checkbox"/> Turbidity <input type="checkbox"/> Nitrate <input type="checkbox"/> Nitrite <input type="checkbox"/> Orthophos <input type="checkbox"/> Other
Rush Turn Around Time Requested?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	6.
Sufficient Volume?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	7.
Correct Containers Used? -Pace Containers Used?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	8.
Containers Intact?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	9.
Field Filtered Volume Received for Dissolved Tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	10. Is sediment visible in the dissolved container? <input type="checkbox"/> Yes <input type="checkbox"/> No
Is sufficient information available to reconcile the samples to the COC?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	11. If no, write ID/ Date/Time on Container Below: See Exception <i>[Container ID]</i>
Matrix: <input checked="" type="checkbox"/> Water <input type="checkbox"/> Soil <input type="checkbox"/> Oil <input type="checkbox"/> Other		
All containers needing acid/base preservation have been checked?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	12. Sample # <input type="checkbox"/> NaOH <input type="checkbox"/> HNO ₃ <input type="checkbox"/> H ₂ SO ₄ <input type="checkbox"/> Zinc Acetate
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO ₃ , H ₂ SO ₄ , <2pH, NaOH>9 Sulfide, NaOH>12 Cyanide)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Positive for Res. <input type="checkbox"/> Yes Chlorine? <input type="checkbox"/> Yes <input type="checkbox"/> No pH Paper Lot# <input type="checkbox"/> Res. Chlorine 0-6 Roll 0-6 Strip 0-14 Strip
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Headspace in VOA Vials (greater than 6mm)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	13. See Exception <i>[Headspace Description]</i>
Trip Blank Present?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	14. Pace Trip Blank Lot # (if purchased): <i>N/A</i>
CLIENT NOTIFICATION/RESOLUTION		Field Data Required? <input type="checkbox"/> Yes <input type="checkbox"/> No
Person Contacted:	Date/Time:	
Comments/Resolution:		
Project Manager Review: <i>Lathan Botney</i>	Date: <i>5/20/19</i>	
Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers).		
Labeled by: <i>[Signature]</i>		

QC Matric lot #: 186509
Time of Spiking: 05/20/19 15:30
SPE Cartridge: S322-0024
Balance: 10BALQ

TRIZMA Lot #: 183004/18F285
Optima H2O Lot #: 187814
Methanol Lot #: 187805

Extract Start: 05/21/19 16:00
Extract End: 05/21/19 17:30
Setup By: QL/PY

	Lot Number	Amount	Initials	Expiration	Dispenser	Witness
Internal	12332-190	100	NH	11/22/19	Q503	py
Surrogate	12332-187	100	PY	11/10/19	Q523	QL
Native Lo	12332-167	10	PY	10/19/19	Q523	QL
Native Mid	12332-167	100	PY	10/19/19	Q523	QL
Native Hi						
GenX IS	12332-175	200	PY	10/25/19	Q497	QL

#	Sample ID	GenX IS	Surrogate	Natives	Full Bottle Weight	Empty Bottle Weight	Amount Extracted	Comments
1	BLANK-70627	X	X		297.5	36.7	260.8	
2	LCS-70628	X	X	X	296.5	36.7	259.8	
3	LCS-70629	X	X	X	294.2	36.2	258.0	
4	LCSD-70630	X	X	X	297.3	36.6	260.7	
5	10474759001	X	X		281.2	37.3	243.9	
6	10474759002	X	X		279.5	37.0	242.4	
7	10474760001	X	X		280.4	37.1	243.3	
8	10474998001	X	X		286.8	36.9	249.9	
9	10474998002	X	X		285.4	37.0	248.4	
10	10474998003	X	X		280.9	36.7	244.1	
11	10474998004	X	X		293.2	37.1	256.1	
12	10474998005	X	X		63.3	13.0	50.3	
13	10474998006	X	X		286.6	37.5	249.0	
14	10474998007	X	X		280.6	36.9	243.8	
15	10474998008	X	X		295.0	37.0	258.0	
16	10474998009	X	X		294.5	38.6	255.9	
17	10475035006	X	X		276.4	36.6	239.8	
18	10475035007	X	X		285.5	38.5	246.9	
19	10475346001	X	X		281.6	37.2	244.5	
20	10474759002-DUP	X	X		280.8	37.2	243.6	
21	10473429008-R	X	X		288.5	36.7	251.8	
22	10473429009-R	X	X		288.8	36.7	252.2	



EB-24629

Appendix B

Sample Analysis Summary



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Method 537 (Modified)
Sample Analysis Summary

Client's Sample ID	WW-20190513-002-DAY11	Date Extracted	05/21/2019
Lab Sample ID	10475346001	Total Amount Extracted	244 mL
Filename	B190605B_084	ICAL ID	190605A02
Matrix	Water	Starting CCal	B190605B_079
Collected	05/13/2019	Ending CCal	B190605B_085
Received	05/17/2019	Method Blank Filename	B190523C_008

Compound	Concentration (ng/L)	PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFOS	ND	2.0	0.64	1	06/07/201903:19	1763-23-1	N2

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.0	100	70 - 130	Pass
13C2_PFDA	2.0	1.8	90	70 - 130	Pass
d5-EtFOSAA	8.0	7.0	88	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPOPrA	376817	175772 - 527315	301640 - 603281	Pass
13C2_PFOA	446173	241388 - 724164	362132 - 724265	Pass
13C4_PFOS	748660	370672 - 1112015	558751 - 1117503	Pass
d3-MeFOSAA	766543	330534 - 991601	615154 - 1230308	Pass

50-150% of Ical area

70-140% of the preceding CCV area

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.

Appendix C

QC and Calibration Results Summary



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Method 537 (Modified) Blank Analysis Summary

Lab Sample ID	BLANK-70627	Total Amount Extracted	261 mL
Filename	B190523C_008	ICAL ID	190522A02
Matrix	Water	Starting CCal	B190523C_004
Date Extracted	05/21/2019	Ending CCal	B190523C_017

Compound	Concentration (ng/L)	PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
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PFOS	ND	1.8	0.60	1	05/23/2019 21:56	1763-23-1	N2
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Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.7	84	70 - 130	Pass
13C2_PFDA	2.0	2.3	114	70 - 130	Pass
d5-EtFOSAA	8.0	8.4	105	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPOPrA	116678	57101 - 171302	75023 - 150045	Pass
13C2_PFOA	427657	177885 - 533654	274161 - 548322	Pass
13C4_PFOS	589826	262955 - 788866	396931 - 793862	Pass
d3-MeFOSAA	144621	71669 - 215006	116571 - 233141	Pass

50-150% of Ical area

70-140% of the preceding CCV area

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.



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Method 537 (Modified) Laboratory Control Sample (LCS)

LCS Lab Sample ID	LCS-70628	Matrix	Water
LCS Filename	B190523C_009	Dilution	1
Total Amount Extracted	260mL	Extracted	05/21/2019
ICAL ID	190522A02	Analyzed	05/23/2019 22:08
Start CCal Filename	B190523C_004	Injected By	WM
End CCal Filename	B190523C_017		
Method Blank Filename	B190523C_008		

Compound	Spiked (ng/L)	Recovered (ng/L)	Recovery %	Limits
PFOS	1.8	1.6 J	85	50.0 - 150.0

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	94	70 - 130	Pass
13C2_PFDA	2.0	2.3	116	70 - 130	Pass
d5-EtFOSAA	8.0	7.9	98	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrOPrA	114514	57101 - 171302	75023 - 150045	Pass
13C2_PFOA	406367	177885 - 533654	274161 - 548322	Pass
13C4_PFOS	608542	262955 - 788866	396931 - 793862	Pass
d3-MeFOSAA	145122	71669 - 215006	116571 - 233141	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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Method 537 (Modified) Laboratory Control Sample (LCS)

LCS Lab Sample ID	LCS-70629	Matrix	Water
LCS Filename	B190523C_010	Dilution	1
Total Amount Extracted	258mL	Extracted	05/21/2019
ICAL ID	190522A02	Analyzed	05/23/2019 22:19
Start CCal Filename	B190523C_004	Injected By	WM
End CCal Filename	B190523C_017		
Method Blank Filename	B190523C_008		

Compound	Spiked (ng/L)	Recovered (ng/L)	Recovery %	Limits
PFOS	19	17	92	70.0 - 130.0

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.8	89	70 - 130	Pass
13C2_PFDA	2.0	2.3	116	70 - 130	Pass
d5-EtFOSAA	8.0	8.1	101	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrOPrA	104331	57101 - 171302	75023 - 150045	Pass
13C2_PFOA	408849	177885 - 533654	274161 - 548322	Pass
13C4_PFOS	602997	262955 - 788866	396931 - 793862	Pass
d3-MeFOSAA	144929	71669 - 215006	116571 - 233141	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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Method 537 (Modified) Laboratory Control Sample Duplicate (LCSD)

LCSD Lab Sample ID	LCSD-70630	LCS Filename	B190523C_010
LCSD Filename	B190523C_011	Matrix	Water
Total Amount Extracted	261mL	Dilution	1
ICAL ID	190522A02	Extracted	05/21/2019
Start CCAL Filename	B190523C_004	Analyzed	05/23/2019 22:31
End CCAL Filename	B190523C_017	Injected By	WM
Method Blank Filename	B190523C_008		

Compound	Spiked (ng/L)	Recovered (ng/L)	Recovery %	Recovery Limits	RPD %
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PFOS	18	19	103	70.0 - 130.0	10
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Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.8	88	70 - 130	Pass
13C2_PFDA	2.0	2.2	109	70 - 130	Pass
d5-EtFOSAA	8.0	8.0	100	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPOPrA	88281	57101 - 171302	75023 - 150045	Pass
13C2_PFOA	420292	177885 - 533654	274161 - 548322	Pass
13C4_PFOS	579577	262955 - 788866	396931 - 793862	Pass
d3-MeFOSAA	147502	71669 - 215006	116571 - 233141	Pass

50-150% of Ical area

70-140% of the preceding CCV area

**PFAA Initial Calibration Response Factor Summary**

ICAL ID	190522A02	Data Files:	CS-1	B190522A_004	08:06
Calibration Date	05/22/2019		CS-2	B190522A_005	08:18
Instrument	10LCMS02		CS-3	B190522A_006	08:30
Column Phase	C18		CS-4	B190522A_007	08:41
Column ID No.	H18-061776		CS-5	B190522A_008	08:53
Analyst	NH		CS-6	B190522A_009	09:05

Response Factors

Compound	Type	CAL1	CAL2	CAL3	CAL4	CAL5	CAL6	Slope	R ²
13C3_PFPrOPrA	L	8150	7480	7260	6950	6700	6290	7140	0.993
13C2_PFOA	L	168000	180000	181000	181000	179000	178000	178000	0.999
13C4_PFOS	L	91000	91400	95500	91600	88800	91400	91600	1.000
d3-MeFOSAA	L	17800	18700	16700	18000	18700	17600	17900	0.999
13C2_PFHxA	L	1.31	1.21	1.18	1.22	1.22	1.20	1.22	0.999
13C2_PFDA	L	9.29	8.38	9.47	8.99	8.05	8.56	8.79	0.997
d5-EtFOSAA	L	0.838	0.758	0.821	0.788	0.758	0.774	0.789	0.999
PFBA	L	1.03	0.908	0.938	0.952	0.947	0.926	0.932	1.000
PFPeA	L	1.16	1.04	1.09	1.11	1.08	1.03	1.04	0.999
PFBS	L	0.605	0.537	0.548	0.552	0.560	0.537	0.542	1.000
PFHxA	L	1.24	1.10	1.14	1.12	1.09	1.07	1.08	1.000
PFPrOPrA	L	1.73	1.64	1.61	1.71	1.67	1.75	1.73	1.000
PFHpA	L	1.16	1.08	1.11	1.14	1.14	1.04	1.07	0.998
NaDONA	L	24.3	27.7	29.1	29.6	29.8	28.8	29.0	1.000
PFHxS	L	0.485	0.396	0.434	0.431	0.421	0.433	0.431	1.000
PFOA	L	1.02	0.939	0.970	0.998	0.992	0.938	0.951	0.999
PFNA	L	1.60	1.66	1.62	1.71	1.73	1.61	1.64	0.999
PFOS	L	1.10	1.02	0.977	1.08	1.07	1.02	1.03	0.999
PFDA	L	6.81	6.79	8.17	7.49	7.20	7.21	7.23	1.000
PFUdA	L	10.8	10.9	12.0	10.9	10.4	10.8	10.8	1.000
N-MeFOSAA	L	0.990	0.970	1.16	1.07	1.05	1.09	1.08	1.000
N-EtFOSAA	L	1.10	1.12	1.26	1.19	1.14	1.14	1.14	1.000
PFDS	L	5.33	5.22	5.95	5.53	5.19	5.50	5.45	0.999
PFDoA	L	6.14	6.01	6.86	6.77	6.12	6.64	6.55	0.999
PFTrDA	L	6.21	5.78	7.19	6.92	6.79	6.91	6.89	1.000
PFTeDA	L	1.98	1.95	2.22	2.06	2.05	2.10	2.09	1.000
PFHxDA	L	3.64	3.21	3.69	3.54	3.41	3.75	3.67	0.999
PFODA	L	1.70	1.58	1.84	1.83	1.76	1.80	1.79	1.000

Slope: Linear calibration

**PFAA Initial Calibration Recovery Summary**

ICAL ID	190522A02	Data Files:	CS-1	B190522A_004	08:06
Calibration Date	05/22/2019		CS-2	B190522A_005	08:18
Instrument	10LCMS02		CS-3	B190522A_006	08:30
Column Phase	C18		CS-4	B190522A_007	08:41
Column ID No.	H18-061776		CS-5	B190522A_008	08:53
Analyst	NH		CS-6	B190522A_009	09:05

%Recoveries

Compound	CAL1	CAL2	CAL3	CAL4	CAL5	CAL6
13C3_PFPPrOPrA	114	105	102	97	94	88
13C2_PFOA	94	101	102	102	101	100
13C4_PFOS	99	100	104	100	97	100
d3-MeFOSAA	100	104	93	101	104	98
13C2_PFHxA	107	99	97	100	99	98
13C2_PFDA	106	95	108	102	92	97
d5-EtFOSAA	106	96	104	100	96	98
PFBA	111	97	101	102	102	99
PFPeA	111	100	104	106	104	99
PFBS	112	99	101	102	103	99
PFHxA	115	102	106	104	101	99
PFPrOPrA	100	95	93	99	97	101
PFHpA	108	101	105	107	107	98
NaDONA	84	95	100	102	103	99
PFHxS	113	92	101	100	98	101
PFOA	107	99	102	105	104	99
PFNA	98	101	99	105	106	98
PFOS	107	99	95	104	104	99
PFDA	94	94	113	104	100	100
PFUdA	100	101	111	101	97	101
N-MeFOSAA	91	90	107	99	97	101
N-EtFOSAA	96	98	110	104	100	100
PFDS	98	96	109	101	95	101
PFDoA	94	92	105	103	93	101
PFTrDA	90	84	104	100	99	100
PFTeDA	95	93	106	99	98	101
PFHxDA	99	87	100	96	93	102
PFODA	95	88	103	102	98	100



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**Method 537 (Modified) Calibration Verification Summary
ICV**

Lab Calibration ID	ICV-12332-189	Instrument ID	10LCMS02
Run File Name	B190522A_011	Column ID	H18-061776
Injected By	WM	Ical ID	190522A02
Analyzed	05/22/2019 09:28		

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	19	18	97	70.0-130.0	447827

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	97	70 - 130	Pass
13C2_PFDA	2.0	2.1	105	70 - 130	Pass
d5-EtFOSAA	8.0	7.8	98	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPrA	100665	57101 - 171302	---	Pass
13C2_PFOA	380314	177885 - 533654	---	Pass
13C4_PFOS	538861	262955 - 788866	---	Pass
d3-MeFOSAA	150404	71669 - 215006	---	Pass

50-150% of Ical area

70-140% of the preceding CCV area

**PFAA Initial Calibration Response Factor Summary**

ICAL ID	190605A02	Data Files:	CS-1	B190605A_003	09:02
Calibration Date	06/05/2019		CS-2	B190605A_004	09:14
Instrument	10LCMS02		CS-3	B190605A_005	09:26
Column Phase	C18		CS-4	B190605A_006	09:37
Column ID No.	H18-061776		CS-5	B190605A_007	09:49
Analyst	NH		CS-6	B190605A_008	10:01

Response Factors

Compound	Type	CAL1	CAL2	CAL3	CAL4	CAL5	CAL6	Slope	R ²
13C3_PFPrOPrA	L	22500	23100	19700	23000	21900	21600	22000	0.997
13C2_PFOA	L	242000	245000	247000	249000	242000	224000	241000	0.999
13C4_PFOS	L	133000	135000	131000	131000	128000	118000	129000	0.998
d3-MeFOSAA	L	88600	86400	84400	81700	79000	75700	82600	0.997
13C2_PFHxA	L	1.31	1.30	1.31	1.22	1.24	1.36	1.29	0.999
13C2_PFDA	L	3.27	3.50	3.83	3.81	3.93	3.70	3.67	0.996
d5-EtFOSAA	L	0.914	0.825	0.867	0.943	0.904	0.869	0.887	0.998
PFBA	L	0.853	0.841	0.788	0.785	0.775	0.840	0.825	0.999
PFPeA	L	0.981	1.05	0.970	0.945	0.918	0.963	0.954	1.000
PFBS	L	0.529	0.549	0.498	0.505	0.512	0.533	0.527	1.000
PFHxA	L	0.964	1.02	0.938	0.905	0.913	0.922	0.920	1.000
PFPrOPrA	L	1.66	1.51	1.67	1.36	1.33	1.44	1.42	0.999
PFHpA	L	1.06	1.18	1.08	1.16	0.971	1.05	1.04	0.998
NaDONA	L	12.7	14.2	15.1	12.6	12.5	10.9	11.4	0.995
PFHxS	L	0.388	0.389	0.362	0.361	0.372	0.371	0.371	1.000
PFOA	L	0.976	0.975	0.884	0.923	0.870	0.885	0.884	1.000
PFNA	L	1.64	1.74	1.68	1.64	1.53	1.69	1.66	0.999
PFOS	L	0.850	0.871	0.905	0.875	0.860	0.862	0.863	1.000
PFDA	L	2.17	2.40	2.42	2.66	2.49	2.52	2.52	1.000
PFUdA	L	3.19	3.54	3.44	3.67	3.57	3.46	3.49	1.000
N-MeFOSAA	L	0.868	0.922	0.927	0.941	0.851	0.967	0.944	0.998
N-EtFOSAA	L	0.920	1.06	0.921	0.975	1.01	0.927	0.944	0.999
PFDS	L	1.62	1.82	1.73	1.72	1.82	1.74	1.75	1.000
PFDoA	L	2.72	2.82	2.82	2.99	2.69	2.98	2.92	0.998
PFTrDA	L	2.13	2.44	2.34	2.42	2.48	2.47	2.47	1.000
PFTeDA	L	1.27	1.36	1.33	1.47	1.42	1.45	1.44	1.000
PFHxDA	L	1.94	2.14	2.00	2.13	2.06	2.13	2.11	1.000
PFODA	L	1.51	1.73	1.65	1.76	1.72	1.80	1.78	1.000

Slope: Linear calibration

**PFAA Initial Calibration Recovery Summary**

ICAL ID	190605A02	Data Files:	CS-1	B190605A_003	09:02
Calibration Date	06/05/2019		CS-2	B190605A_004	09:14
Instrument	10LCMS02		CS-3	B190605A_005	09:26
Column Phase	C18		CS-4	B190605A_006	09:37
Column ID No.	H18-061776		CS-5	B190605A_007	09:49
Analyst	NH		CS-6	B190605A_008	10:01

%Recoveries

Compound	CAL1	CAL2	CAL3	CAL4	CAL5	CAL6
13C3_PFPrOPrA	103	105	90	105	100	98
13C2_PFOA	100	102	102	103	100	93
13C4_PFOS	103	104	101	101	99	91
d3-MeFOSAA	107	105	102	99	96	92
13C2_PFHxA	102	101	101	94	96	105
13C2_PFDA	89	95	104	104	107	101
d5-EtFOSAA	103	93	98	106	102	98
PFBA	103	102	95	95	94	102
PFPeA	103	110	102	99	96	101
PFBS	100	104	94	96	97	101
PFHxA	105	111	102	98	99	100
PFPrOPrA	117	107	118	96	94	101
PFHpA	101	113	103	111	93	101
NaDONA	111	125	133	111	110	96
PFHxS	105	105	98	97	100	100
PFOA	110	110	100	104	98	100
PFNA	99	105	101	99	93	102
PFOS	99	101	105	101	100	100
PFDA	86	95	96	106	99	100
PFUdA	91	101	98	105	102	99
N-MeFOSAA	92	98	98	100	90	103
N-EtFOSAA	97	112	98	103	107	98
PFDS	92	104	98	98	104	99
PFDoA	93	97	96	102	92	102
PFTrDA	86	99	95	98	101	100
PFTeDA	88	94	92	102	98	100
PFHxDA	92	101	95	101	97	101
PFODA	85	97	93	99	96	101



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Method 537 (Modified) Calibration Verification Summary ICV

Lab Calibration ID ICV-12332-196
Run File Name B190605A_009
Injected By WM
Analyzed 06/05/2019 10:13
Instrument ID 10LCMS02
Column ID H18-061776
Ical ID 190605A02

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	19	19	99	70.0-130.0	527127

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.1	104	70 - 130	Pass
13C2_PFDA	2.0	1.9	93	70 - 130	Pass
d5-EtFOSAA	8.0	8.1	101	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPnOPrA	382088	175772 - 527315	---	Pass
13C2_PFOA	467426	241388 - 724164	---	Pass
13C4_PFOS	741555	370672 - 1112015	---	Pass
d3-MeFOSAA	687332	330534 - 991601	---	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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**Method 537 (Modified) Calibration Verification Summary
ICV**

Lab Calibration ID	ICV-12332-189	Instrument ID	10LCMS02
Run File Name	B190522A_011	Column ID	H18-061776
Injected By	WM	Ical ID	190522A02
Analyzed	05/22/2019 09:28		

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	19	18	97	70.0-130.0	447827

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	97	70 - 130	Pass
13C2_PFDA	2.0	2.1	105	70 - 130	Pass
d5-EtFOSAA	8.0	7.8	98	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPnOPrA	100665	57101 - 171302	---	Pass
13C2_PFOA	380314	177885 - 533654	---	Pass
13C4_PFOS	538861	262955 - 788866	---	Pass
d3-MeFOSAA	150404	71669 - 215006	---	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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Method 537 (Modified) Calibration Verification Summary ICV

Lab Calibration ID ICV-12332-196
Run File Name B190605A_009
Injected By WM
Analyzed 06/05/2019 10:13
Instrument ID 10LCMS02
Column ID H18-061776
Ical ID 190605A02

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	19	19	99	70.0-130.0	527127

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.1	104	70 - 130	Pass
13C2_PFDA	2.0	1.9	93	70 - 130	Pass
d5-EtFOSAA	8.0	8.1	101	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrOPrA	382088	175772 - 527315	---	Pass
13C2_PFOA	467426	241388 - 724164	---	Pass
13C4_PFOS	741555	370672 - 1112015	---	Pass
d3-MeFOSAA	687332	330534 - 991601	---	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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**Method 537 (Modified) Calibration Verification Summary
CCV**

Lab Calibration ID	CAL-12332-188-03	Instrument ID	10LCMS02
Run File Name	B190523C_004	Column ID	H18-061776
Injected By	WM	Ical ID	190522A02
Analyzed	05/23/2019 21:09	Level	Mid

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	9.6	9.8	103	70.0-130.0	250815

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.0	100	70 - 130	Pass
13C2_PFDA	2.0	1.9	97	70 - 130	Pass
d5-EtFOSAA	8.0	8.1	101	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPtA	107175	57101 - 171302	79538 - 159076	Pass
13C2_PFOA	391659	177885 - 533654	259754 - 519508	Pass
13C4_PFOS	567045	262955 - 788866	412254 - 824509	Pass
d3-MeFOSAA	166529	71669 - 215006	112981 - 225962	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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Method 537 (Modified) Calibration Verification Summary CCV

Lab Calibration ID	CAL-12332-188-03	Instrument ID	10LCMS02
Run File Name	B190523C_017	Column ID	H18-061776
Injected By	WM	Ical ID	190522A02
Analyzed	05/23/2019 23:42	Level	Mid

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	9.6	9.4	98	70.0-130.0	244842

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.0	98	70 - 130	Pass
13C2_PFDA	2.0	2.0	100	70 - 130	Pass
d5-EtFOSAA	8.0	7.8	98	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPtA	124578	57101 - 171302	75023 - 150045	Pass
13C2_PFOA	412309	177885 - 533654	274161 - 548322	Pass
13C4_PFOS	579154	262955 - 788866	396931 - 793862	Pass
d3-MeFOSAA	166382	71669 - 215006	116571 - 233141	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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**Method 537 (Modified) Calibration Verification Summary
CCV**

Lab Calibration ID	CAL-12332-188-03	Instrument ID	10LCMS02
Run File Name	B190605B_079	Column ID	H18-061776
Injected By	WM	Ical ID	190605A02
Analyzed	06/07/2019 02:20	Level	Mid

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	9.6	10	110	70.0-130.0	314866

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	97	70 - 130	Pass
13C2_PFDA	2.0	1.5	76	70 - 130	Pass
d5-EtFOSAA	8.0	8.0	100	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrOPrA	430915	175772 - 527315	238938 - 477876	Pass
13C2_PFOA	517332	241388 - 724164	343450 - 686901	Pass
13C4_PFOS	798216	370672 - 1112015	513529 - 1027057	Pass
d3-MeFOSAA	878792	330534 - 991601	454447 - 908895	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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**Method 537 (Modified) Calibration Verification Summary
CCV**

Lab Calibration ID	CAL-12332-188-03	Instrument ID	10LCMS02
Run File Name	B190605B_085	Column ID	H18-061776
Injected By	WM	Ical ID	190605A02
Analyzed	06/07/2019 03:31	Level	Mid

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	9.6	10	107	70.0-130.0	323733

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.7	87	70 - 130	Pass
13C2_PFDA	2.0	1.9	95	70 - 130	Pass
d5-EtFOSAA	8.0	7.9	99	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPrA	395287	175772 - 527315	301640 - 603281	Pass
13C2_PFOA	527450	241388 - 724164	362132 - 724265	Pass
13C4_PFOS	840323	370672 - 1112015	558751 - 1117503	Pass
d3-MeFOSAA	716990	330534 - 991601	615154 - 1230308	Pass

50-150% of Ical area

70-140% of the preceding CCV area